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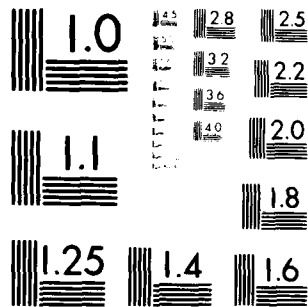   OCT 71   R E HAINES, I A HUNT, R G SMITH

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CONARC TRAINING WORKSHOP,

FORT GORDON, GEORGIA,

5-7 OCTOBER 1971,

Sponsored by

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Hosted by

US Army Southeastern Signal School

Final Report. In Seven Volumes

VOLUME IV,

Individualized Instruction Speciality Workshop,

GENERAL RALPH E. HAINES, JR.

Commanding General

US Continental Army Command

SEP 1 8 1980

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Deputy Chief of Staff for Individual Training

US Continental Army Command

CONARC TRAINING WORKSHOP
Fort Gordon, Georgia
5-7 October 1971

Volume IV - Individualized Instruction Specialty Workshop

CONTENTS

CONTENTS (Continued)

11

CONARC TRAINING WORKSHOP

5-7 October 1971

US Army Southeastern Signal School

Fort Gordon, Georgia

INDIVIDUALIZED INSTRUCTION

INDIVIDUALIZED INSTRUCTION SPECIALTY WORKSHOP

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INDIVIDUALIZED INSTRUCTION SUMMARY

Dr. Robert Smith
HumRRO

General Hunt, Ladies and Gentlemen, individualized training is
alive and growing in the services. All the services are trying
to individualize training and are exercising great ingenuity in
trying to solve the administrative problems and the problems of
obtaining student mastery of the objectives. A number of problems
still remain, and these problems seem primarily those of trying to
get the school and its systems to match with the Army as a whole
and its systems. For instance, there was concern over the fact
that, if you have a go/no-go testing situation in which nearly
everybody passes, you still are required somehow or other to
rank students to obtain an honor graduate. There were problems
with regard to Department of the Army assignment procedures and
how that could be made to mesh efficiently and economically with
individualized training. There is also the problem of promotions
- you have a student who is making such good progress through
the course that he may not meet the minimum time in grade re-
quirements to obtain a promotion, yet he is clearly an outstanding
student because of the progress that he has made.

Most of the services, I believe all three services, have some form
of self-paced project in electronics going. I would like to point
out to all of you that there is in the area of electronics training
one really great unutilized set of research findings, and these re-
search findings are that, if you design manuals based on a carefully
done analysis of what kinds of information the maintenance technician
really needs to solve problems and find troubles, then you discover
that you can then make significant changes in the training system.

Now, individualization as presented in the workshop has been based
very firmly on the systems approach. I feel that the next most
important problem is to begin to use the techniques of behavior
modification, based on the work of B. F. Skinner, to motivate
trainees through rewards. THe reason that I think this is especially
important is that, being in a rewarding situation tends to become
intrinsically rewarding to the student. And if the Army is moving
toward a predominately volunteer service, I think it is desirable for
the Army to become a predominately rewarding situation.

Now, I'd like finally to say that I've observed Army training at
fairly close range for something like thirteen years now, and I
have yet to see the Army training system as open to new ideas and
new research findings as it is now. All kinds of things, and very
interesting things, are going on. And there doesn't seem to be a
great deal of foot-dragging in the sense of being unwilling to
change old practices in evidence; and I would like to commend all
of you for this. Thank you.

Specialty Workshop Schedule

for

INDIVIDUALIZED INSTRUCTION

SESSION NO. 1 -- Overview of Individualization of Instruction

5 Oct	6 Oct	
1400-1430	1400-1430	Concepts and Applications of Individualized Instruction in Education and Training -- Dr Smith, HumRRO
1430-1500	1430-1500	Utilizing Peer Instruction (HumRRO Task "APSTRAT") -- Mr Weingarten, HumRRO
1500-1530	1500-1530	Panel and Discussion -- Mr Crick, USASESS (Discussion Ldr)

- -

SESSION NO. 2 -- Utilizing Individualized Instruction in High-Density Army Courses

5 Oct	6 Oct	
1550-1615	1550-1615	Clerk, Clerk-Typist, Personnel Specialist, and Key Punch Operator Training -- CPT Vaughn, USAAGS
1615-1640	1615-1640	Common Basic Electronics Training (COBET) -- Mr Anderson, USASCS
1640-1700	1640-1700	Panel and Discussion -- Mr Crick, USASESS (Discussion Ldr)

- -

SESSION NO. 3 -- Lessons Learned from Applications of Individualized Instruction

6 Oct	7 Oct	
0830-0900	0830-0900	Individualized Instruction in the Air Force -- MAJ Meade, Air Tng Comd
0900-0930	0900-0930	Individualized Instruction in the Navy -- Mr Monnes, Bur Nav Pers
0930-1000	0930-1000	Individualized Instruction -- 1LT Jan Soulier, USAQMS; Dr Hunter, HumRRO
1000-1030	1000-1030	Panel and Discussion -- Mr Crick, USASESS (Discussion Ldr)

- -

SESSION NO. 4 -- Administering and Managing Self-Paced Training Programs

6 Oct	7 Oct	
1100-1130	1045-1115	Management and Control of Self-Paced Training in the USASESS -- COL Bean, 1LT Connolly, and Mr Danilovich, USASESS
1130-1145	1115-1130	Panel and Discussion -- Mr Crick, USASESS (Discussion Ldr)
1145-1200	1130-1145	DA Control Processes for Students Involved in Self-Paced Courses of Instruction --
1200-1215	1145-1200	Discussion -- Mr Crick, USASESS (Discussion Ldr)

CONCEPTS AND APPLICATIONS OF INDIVIDUALIZED
INSTRUCTION IN EDUCATION AND TRAINING

Dr. Robert G. Smith, Jr., HumRRO

People are different. It was consideration of some of these
differences in the French Chamber of Deputies which led to the
famous punch line, "Vive le difference!" It is, however, the
differences which are concerned with rates of learning and
interest in learning different things that have bedeviled train-
ing and education for decades.

Let us take a look at the problem in historical perspective.
Imagine yourself a schoolmaster in rural America in 1820. You have
a one-room school containing twenty students. Each student is
studying his own personal curriculum. There is no relation between
what a student is learning and his age. You have five year olds
and eighteen year olds learning to read, for instance. The sheer
problems of keeping this twenty-ring circus going were enormous.

It was little wonder that, starting in 1848 in Quincy, Massachusetts,
the system of grades looked like a marvelous solution. Sweeping
the country in only twenty years (a very short time for an educa-
tional innovation), it segregated students by age, and then seg-
mented the material to be learned in ways thought to be appropriate
to the age level of the students. Teachers could then specialize
in teaching a specific segment, just like military instructors do.

The grade system deals with the problem of individual differences
by grouping students on the basis of age. But this solution
led to a very rigid mold in which the French Minister of Education
could claim that he knew what was being taught in every classroom
every hour of every day.

Even within age levels, there were differences. These became
a great problem when, because of failure to pass, there were, after
the third grade, older, poorer students still mixed in with the
others. So, the French government asked Alfred Binet to study the
problem. In the early 1900's, Binet and his colleague Simon devel-
oped the first intelligence test, for the purpose of identifying
slow learners so they could be segregated into special classes.

From Binet's work stemmed the aptitude tests with which we are
all familiar, and which have been used to group or screen students
by intellectual ability. Unfortunately, attempts to group students
by aptitude have not been very successful either.

IV-5

More recently, the movement toward the non-graded school has
attracted attention as a means of escaping the rigidities of the
graded system. However, simply doing away with grades does not
yield success, as research has indicated. What is needed is a
grasp of the positive things we need to develop effective instruc-
tion.

So, here we are, at full circle, having tried grouping, and looking
yearningly toward the individualized instruction of the country
schoolmaster as a means of solving our problem. This may sound
pessimistic, but I don't feel that way. I feel we know much more
now about the conditions which make for effective individualized
instruction, and it is those things I, and the other speakers here
will want to describe to you.

The recent renewal of interest in individualized instruction has led
to the proponents of certain techniques claiming that they were
individualized whereas other techniques were not. This situation
usually means that there is a need to draw distinctions between
various aspects of a problem. Accordingly, I would like to dis-
tinguish between five forms that individualization may take.

First, there is Rate Individualization. Here the student progresses
at his own rate, moving as fast or as slow as he would like, or be
motivated to go. An example is the linear program form of pro-
grammed instruction, or learning to play a musical instrument with a
private teacher.

The next form is Remedial Individualization. In this form, the
student studies and then is tested. If he does not "pass", he
repeats or is given additional remedial material. This is illus-
trated by the scrambled book form of programmed instruction. It is
also widely used in the service schools, where it is called re-
cycling.

In Proficiency Individualization, we provide the student with
differing learning tasks depending on his level of proficiency at
the start of instruction. If the student already possesses some
knowledge or skills, and can demonstrate them, we do not require
him to relearn them. For example, I understand that in the elec-
tives program for the career course at one Army School, time for
electives was obtained by this method.

Objective Individualization permits the student either to choose or
to be assigned to different objectives. Elective systems are ex-
amples of this type of individualization.

Finally, we have Method Individualization. Here, different students
may learn by methods which are most appropriate.

We can see that there are a variety of forms individualization can take. However, none are likely to be successful unless embodied in an instructional system.

I have a recently published book, The Engineering of Educational and Training Systems (Smith, 1971) which deals generally with system engineering in training. I would like to describe the major problems which must be solved if individualized instruction is to be effective. These are first, the logistics-administrative problem, second, the requirement for mastery, and third, the problem of motivating students to move through the system.

When we can plan for a specific course input and a specific course output some weeks later, it makes many administrative and logistics matters easy to plan for. We all know that the programmed input and output may not hold, but there are few major perturbations. We know how to plan for later personnel assignments, housing, food, range facilities, medical service, training equipment, and the like.

Whenever we introduce individualization and take it seriously, we project an increased element of uncertainty, and of probability into these logistic and administrative matters. I can certainly sympathize with those who may want to go slow until new mechanisms and arrangements can be found to deal with the uncertainties.

At the same time, unless we begin to individualize, we will never get the answers to these uncertainties. The answers must come from selective analysis, modeling, and experimentation. All three of these techniques must be used to provide the administrative and logistic guidance to training planners. You will hear of some of these matters from later speakers.

The need for these analytic, modeling, and experimental studies is very great if individualization is to be widely used.

Once we are able to solve these adminsitrative and logistics problems, it becomes possible to insist that each student reach all objectives before he graduates. Of course, different students will take longer than others to do this. There will still be a need for aptitude tests to predict the rate of learning. We may find that for some courses, it is just not economical to permit very slow learners to begin.

If we take as our goal that each student demonstrate that he can perform each activity required by the objectives, then we must have a suitable quality control system. The quality control system would use tests which measure the attainment of objectives by the student.

There are two purposes which tests will serve in an individualized training system. The first purpose is to measure the student's performance. If the student's performance is up to the level required by the objective, he passes. If not, we should provide for him to be able to practice until he does pass.

The other purpose of tests is to measure the performance of the instructional system. If too many students fail, then we must change the instructional system until we raise its performance. The solution may be to provide more practice. However, additional practice may not raise performance enough. Then the entire training sequence must be re-examined carefully and restructured until the mastery level is reached by nearly all students. My book on Systems (Smith, 1971) describes these processes in detail.

Now let us turn to the final matter. Let us imagine that we have just opened the doors of our new individualized course. Everything has been planned to let each student progress as fast as he wants to. There's the catch. Why should he want to?

There is just no point in going to all the trouble to develop individualized instruction unless you can make that student progress as fast as he can.

Fortunately, during the past several years behavioral science has come to our rescue with some remarkably powerful motivational techniques. These methods are generally called behavior modification methods. They represent the practical application of the theory of reinforcement developed by Professor B. F. Skinner of Harvard University.

Let us describe the theory first. Let us say we have a student who does the following:

    a. Pays careful attention in class.

    b. Works steadily during practical exercise.

    c. Reads in the textbook after class.

    d. Tells everyone how interested he is in the course.

We would probably say that such a student is motivated. But all we have done is to use an abstract term to describe all these specific behaviors. From here it is a small -- but dangerous -- step to say he has a motive to learn. The reason this is a dangerous step is that few people can resist trying to operate on this motive directly. Since we put it inside the student ourselves, our attempts to change it are doomed to failure.

The behavioral approach is to simply look at the students behavior and his environment. Behavior develops, recurs, and changes because of its consequences for the student. Sometimes the student's environment delivers favorable consequences. Then the behavior that occurred just before those consequences tends to occur again. If the environment does not deliver any consequences, the behavior tends not to be repeated.

Now, the situation is more complicated than that. But look what we have done. Instead of trying to change some mysterious motive inside the student, we change the student's environment, which is much easier.

The original research was done with rats and pigeons as experimental subjects. The new developments have shown that it is quite possible to use these methods to develop the behavior of people.

In mental hospitals, patients who used simply to lie or sit on their beds learned to dress themselves, renew their toilet habits, keep their rooms neat, and perform meaningful work in the hospital. These changes occurred because the patients received tokens for their work. They could exchange these tokens for privileges. In fact, a great deal is now known about how to plan a token economy.

Elementary school children have been stopped from talking out loud, and from wandering around the classroom.

Systems have been developed to increase Job Corps trainees' progress in academic subjects. In this system, contracts are made with the student so he does so much work for specific rewards.

The kind of system that I suspect would work well for the Army is illustrated by the work of Cantrell, Cantrell, Huddleston and Wooldridge (1969). Let us imagine a boy in the fifth grade. He is often late coming to school. He rarely has his outside assignments ready on time. He talks out loud in class, disturbing other students. He wanders around the class a lot. How do we deal with this problem?

First, cooperation was established between the teacher and the parents. The teacher awards points to the boy each time he arrives at school on time, has his outside assignments ready on time, goes an hour without talking, and stays in his seat.

Now, the boy can "spend" the points at home. He is normally required to stay in his room. It costs him points to play, to watch television, or engage in other activities. When tried out with several students, this system brought about drastic changes in behavior, in the desired direction.

Let us now translate this idea to the Army School. The first thing
to remember is that the most important consequences for students
are generally under the control of the student company commander --
not the school.

So, I would try to design a system in which the student earns points
for making progress in school, and can spend these points in both
school and the company.

By trying to present the main outlines of behavior modification, I
have over-simplified the description, and perhaps created an impres-
sion that it is always easy to apply these techniques. It is often
easy to develop effective schemes with individuals. To develop a
full-fledged system may require several trials, for many things can
go wrong.

Unless plans are very carefully prepared, and coordinated and every
one involved thoroughly trained for his role in the system, it will
not work. While the general idea of rewarding people for good be-
havior, seems very reasonable, to apply it in a specific situation
often seems to go against the approved procedures in that situation.
Let me tell you of a few cases that went wrong.

There is, by now, a legendary case in one of the early demonstra-
tions of programmed instruction. Teaching machines were used to
present material and problems, and students could proceed at their
own pace. Some of the experimental students finished earlier than
the others. They were released from school to the student company,
which put them on KP every day. Since most students would rather be
in school than on KP, the experimental students slowed down. Here
finishing early led to unfavorable consequences. Finishing late led
to favorable consequences.

Another problem is that some officials may feel that it is not fair
to make privileges available only to those who have earned them
through appropriate behavior. They then make the privileges avail-
able to everyone, and the system loses its effectiveness.

I have seen situations in which desirable behavior was punished
while undesirable behavior was rewarded. In one course there was an
examination about two weeks after the start of the course. The
failure rate was about 30 per cent, as I recall. Any student fail-
ing was released to the student company, where, for about three
weeks he awaited orders. During that time he had no details, could
get a pass any time he wanted one, and spent a lot of time telling
students what a good time he was having.

The students, meanwhile, received the following treatment for passing the examination. Each day after class, they had to spend forty-five minutes cleaning their area in the school. They were restricted to the barracks every week-day night. They had to perform the usual details. And, they had to listen to the bragging of those who failed.

In another situation, all of the key people were not given a thorough explanation of the need for the various procedures. So, the instructors resented the rewards being given the students, and would sometimes refuse to award points. The most popular reward chosen by the students was free time. Yet, this reward was sometimes not honored by student company personnel, and students who expected to be able to write letters, to go to the PX, or do whatever they wanted were placed on detail.

HumRRO has been successful in training public school teachers to use these methods, so we are very sure that Army instructors and others can learn to use them, too.

I said earlier that the techniques of behavior modification are very powerful. Now, I have been reading the newspaper and watching television during the past year, and there have been many stories about the Army. Most of them have shown an Army with severe problems -- lack of discipline, racial tension, drugs, and lack of the personal security of its own men.

Powerful techniques must be brought to bear on these problems. I would now like to tell you about an effort which is one of the most promising HumRRO has embarked upon. It is aimed at putting the powerful tools of behavior modification in the hands of Army leaders so they can use them to restore discipline and motivate soldiers to carry out their orders.

The name of this effort is SKYGUARD. The development of student performance objectives was an important step toward improved training. The researchers in SKYGUARD are extending these techniques from training to operations. They are developing training for officers so they can learn to develop operational performance objectives. Next, training will be prepared in the use of behavior modification techniques to motivate soldiers to accomplish these operational objectives. Finally, experimental instruction is being prepared in management problem solving.

Let me sum up. People are different, and these differences create problems for trainers. These problems include distinguishing between forms of individualization, logistics and administration, quality control, and the motivation of students.

I have added to this paper a set of references, aimed at permitting those who are interested in pursuing these topics further, to do so.

IV-11

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UTILIZING PEER INSTRUCTION (HumRRO Task "APSTRAT")
Mr. Kenneth Weingarten
HumRRO Division No. 3, Presidio of Monterey, California

The purpose of this specialty workshop is to consider the "whats,"
"whys," and "hows" of individualized instruction. My comments will
center on HumRRO's experience in developing and testing the APSTRAT
instructional model. Since APSTRAT was designed to span the great
spread of aptitudes typical of the students in many Army training
courses, the model has considerable relevance to the main subject
matter of this workshop. Since a full instructional model must
cope in some way with every theoretical and practical issue in-
volved in training and education, my discussion will touch on
many of the subjects being discussed in other specialty workshops
as well -- particularly quality control and methods and media. But
before I get into the model itself, I would like to offer some of
my own views on individualized instruction.

During the past ten years, the emphasis on individualizing instruc-
tion has been growing. There are probably many reasons why this
has happened. Of all these reasons, I think that one deserves
special attention here: if schools and training institutions had
not been failing in an increasingly obvious way to reach large
numbers of students, we would probably not be talking about indiv-
idualization today. In other words, the emphasis on individualized
instruction is really an expression of the need to improve education
and training in those areas where they are now failing. I mention
this because I think it is important to stress that individualiza-
tion need not be considered an end in itself. The cost and diffi-
culty of preparing for, implementing, and managing an individualized
instructional system may be substantial. This suggests that, for
practical purposes, instruction should be individualized only when
there is reasonable assurance that the gains from doing so will out-
weigh the cost and difficulty. For the same reason, the degree of
individualization should not be carried beyond the point of maximum
pay-off; in economics this is referred to as the point of diminish-
ing returns.

What is individualized instruction? In general terms, it is one
technique of matching instruction to the needs, desires, and
abilities of individual students. There are two places where
matching or mismatching may occur: with respect to the objectives
of instruction - that is, the subject matter of skills to be
taught - and methods of instruction - that is, the ways subject
matter or skills are taught. The question of matching and mismatch-
ing - let us call it suitability - is not a simple either/or issue.
Rather it is a question of degrees. While perfect suitability is a
rarity, we can say that the less the suitability for any student of

either the objectives or the method of instruction, the less he will learn. When, in any educational or training program, there is substantial mismatching of objectives or methods for a sizeable proportion of students, the program is clearly wasting a good deal of its resources, that is, equipment, facilities, time, intelligence, and effort. While perfect suitability is also a rarity, we can say that when a program improves its procedures for matching objectives and methods with the needs, desires, and abilities of the great majority of its students, students will learn better, and program resources will be expended in a less wasteful fashion.

The subject of individualizing objectives is beyond the scope of this workshop for the reason that in the context of current Army training substantial improvement in this regard is not likely. I will not pursue this subject further except to say that when a man is to receive training for an MOS that is extremely unsuitable for him, no change in training method is likely to do much good. But if such extreme forms of mismatching are avoided and the method of training is suitable, students should be able to master the required skills. I will now turn to individualizing instructional methods as we approached this issue in developing the APSTRAT model.

At the outset of the project, the APSTRAT staff adopted what is known as the multiple media or alternative media approach. The reasoning underlying this decision is straightforward. Men high on the aptitude and educational scales are used to learning from lectures and written materials; men at the opposite end of the scales – those ranking as mental category IVs – cannot learn well from lectures and often can hardly read. On the basis of this understanding, we decided to design instructional packages covering the full curriculum of a standard CST course. All parts of the curriculum would be represented in at least two formats or media: written programmed manuals for those who could learn or preferred to learn by reading, and other formats such as programmed audio or video tapes, tape-slide presentations, movies, picture books, and games for men who could not, or preferred not, to learn by reading but who could, or would prefer to learn through one or another of these alternative media. Each student would work at a rate that he found comfortable. We felt that, with enough effort, we could develop alternative packages suitable to the needs and preferences of the great majority of students. This was our initial approach to the individualization of instruction.

We selected a course in which to carry out a pilot study. We were looking for a course that was dealing with a wide variety of skills and with a full span of aptitude among its student input. The course selected on this basis was the Field Wireman Course at Fort Ord.

The first step in carrying out our plan was to analyze the curriculum of the Field Wire Course in detail to determine what our instructional packages would contain. We were not at that point concerned with the validity of the curriculum, for example, whether any particular part of the curriculum was representative of what Field Wiremen actually do in their field assignments. We were concerned only with finding out whether we could devise a successful program of individualized instruction.

Our next step was to design instructional packages in alternative forms. This is a difficult and lengthy business, but after several months we had developed some prototypes dealing with telephone installation to the point where they were ready for try-out in our laboratory. We selected samples of men who had just completed BCT and who more or less matched the input into the Field Wireman Course to serve as subjects in these try-outs. We found that the brighter and better educated men learned pretty well regardless of the medium used, while many of the lower aptitude men and those with a poorer educational background did not learn very well even with those media we thought to be particularly well suited to their needs. The prototypes we developed for other parts of the curriculum produced more or less the same results. While we were not pleased with these findings, we were not terribly discouraged, because we knew that materials of the sort we were developing could work well only after repeated try-out and revision. But we were becoming increasingly concerned with the amount of time and manpower that this process of revision involved, especially since we had to revise, not one package per curriculum component, but several. And while this expense might be tolerable in an experimental pilot study, we were afraid that our approach, however successful, might price itself out of the range of practical usefulness. Whether this would have happened or not, we never found out, because at about the same time we had the good fortune to hit upon another approach that allowed us to reach our objective in a much more economical way.

While we were revising the materials on telephone installation, Dr. Hilton Bialek, who was the APSTRAT Work Unit Leader at that time, suggested that we try out another method of instruction. A number of very able cadre had been assigned to HumRRO to serve as content experts to help us in designing the instructional materials. Dr. Bialek suggested that a cadreman should train two subjects to the point that they could pass the test for phone installation. When they had passed this test, each subject would train two more subjects, and if these four subjects could pass the test they, in turn would teach the task to another group of subjects, and so on. We carried out the experiment for four generations, or to the point where twenty-eight subjects had been trained by other subjects. Every subject, regardless of aptitude, passed the test, and - what was more startling - the time required for a man to learn the task

declined from generation to generation. This means that the training of one student by another, or peer-instruction, was not only just as effective as cadre-instruction as measured by a performance test; it was also more efficient in terms of time.

The success of the experiment did not lead us immediately to the conclusion that the peer-instruction should be used for teaching every component of the curriculum (although that is the conclusion we eventually came to). But it did convince us that peer-instruction should be included as an alternative-medium for any task where it seemed appropriate. Unlike the other packages we were working on, it required practically no time to prepare, would not require lengthy revision, and could be added to our list of alternatives with virtually no increase in cost.

Our next step was to try out our alternative media approach under conditions more closely approximating those present in a regular course. Our main concern at this stage, which we refer to as the Phase 1 experimental run, was to see how well our training packages worked and to determine the time required by various students to learn the various tasks by means of these packages. We set up our facilities at Fort Ord. About seventy students, drawn from the regular input of the Field Wireman Course were assigned to us on a temporary basis. Our materials covered about forty percent of the full curriculum.

The most important findings in the Phase 1 experimental run can be summarized very briefly. Most of the students passed our tests and passed the corresponding tests when they returned to the Field Wireman Course. Aside from the written materials, most students learned about as well from any medium. Most of the higher aptitude men preferred non-written media. Almost all students preferred peer-instruction, learned faster through peer-instruction, and felt they had a fuller understanding and mastery of the training tasks after they had taught them to someone else.

As a result of our experience with the Phase 1 experimental run, we gave up the alternative media approach and decided to build a peer-instructional model.

Once the decision was made to go all the way with peer instruction, we began to wrestle with the problem of how to organize and manage such a system, and how to phase it in to an ongoing course. There were several factors we had to take into account.

A peer-instructional system, by freeing the cadre from the necessity of teaching, permits them to concentrate on a job that only they can do, that is, the job of testing students thoroughly on their ability

to perform the tasks of their MOS in competent manner. Without a tremendous increase in personnel, no course in which cadre have the major responsibility for teaching can afford the manpower required for really thorough performance testing; and without this thorough testing it is impossible to know with assurance whether a man who graduates from a course will be capable of carrying out his job with full competence. On the other hand, if a man is required to pass a thorough performance test for every task his MOS calls for, and if the test is a true measure of what he must do on the job, and if he must score one hundred percent in order to pass the test, then we can know this with assurance. It may seem to you that this was a very unrealistic goal, but when we committed ourselves to developing a peer-instructional system, we were at the same time committing ourselves to the achievement of this goal. If this goal was not realistic, then a peer-instructional system could not work. The reason is very simple. It would be very foolish to assign one man to teach another a task when there is no sure way to know whether the first man has mastered the task himself. After all, a prerequisite for a successful teacher is that he should know what he is talking about.

We asked the cadre who were assigned to us to help us design a full set of tests, each of which would state very clearly exactly what a man should be able to do to perform his job competently, leaving out nothing essential, and including nothing inessential. These were the mastery tests we would use in the Phase 2 experimental run, which would be a try-out of the full peer-instructional model.

We had to organize the curriculum on the basis of groups of functional tasks rather than in terms of subject matter. This led to the development of three distinct modules: Field Wire Technique, Switchboard Installation and Operation, and Document Distribution and Radio Operation. We had to allocate the necessary equipment and supervisory-testing personnel to each module.

We also had to design the training cycle for each module and allocate sufficient time so that even the slower learners would be able to master the tasks without exceeding the eight-week limit for all the modules taken together.

In order to save time, I will not describe the results of the Phase 2 experimental run other than to say that it was generally successful; it gave us a greater insight into the need for tight quality control and taught us how to do so; and it encouraged us to embark on the third and final experimental run. The Phase 3 experimental run was conducted by the Field Wire Course itself with the APSTRAT staff serving only in an advisory capacity and collecting data. This restricted role for the APSTRAT staff was decided on in order to

assure that the results of the run would reflect normal course conditions. This was essential, since we wanted to know whether the model would "fly" without our intervention. Our goal, it must be remembered, was not merely to develop a new method of instruction, but to design a full and integrated system capable of coping with all the facts of life, both academic and administrative, that would have to be faced when the model was implemented in an ongoing course. In line with this plan, the cadre who were assigned to HumRRO during the development stage were not returned to the course until the model was fully installed and was operating effectively.

With this background I will now go on to describe the APSTRAT model itself. I will first describe how the model operates and then describe the way it is phased-in in an ongoing course.

As I have already mentioned, the curriculum is organized into modules, each module focusing on a set of interrelated tasks. In the Field Wireman Course there are three such modules; other courses may require a different number.

At all times a number of advanced students will be performing the job-duties in each module, and new students, one for each job-performer, will be observing them during this process. (New students are assigned to job-performers on a random basis, except in the case of students who can communicate well only in a foreign language. In such cases the module supervisor will whenever possible pair the student with someone with whom he can communicate.) During this observation period, the newcomers gain familiarity with the duties they will soon be learning to perform. The length of time devoted to the job performance and observation period will depend on the number of duties to be performed and the time required to perform them. In most cases the period will be no longer than one full training day.

After familiarization with the job duties of the module, the observers go on to acquire the skills and learn the tasks necessary to perform the job themselves. Their instructors during this period are the students whose job-performance they have previously observed. The amount of time allocated to this skills acquisition period is determined by the amount required by slower learners to achieve mastery of the skills they are learning. When both the student and his peer instructor are convinced that the student has mastered the skills necessary to perform a given task, they report to a cadre supervisor who administers a mastery test to the student with the peer-instructor observing. The tests are referred to as mastery tests because the supervisor scores the student on his ability to perform the assigned task without error; a student passes the test only if he performs without error. If he makes any error, even one that might be regarded as relatively minor, he fails the test.

If the student passes the mastery test, he then proceeds with the
next task in the module and repeats the procedure of skill acquisi-
tion and mastery testing until he has passed all the mastery tests
in the module. If a student fails any mastery test, both he and
his peer-instructor are told where he has failed, and the student
must review and practice until he and his instructor feel he is
ready to be tested again. If the student fails the test repeatedly,
he is dropped from the course. He is dropped because repeated
failure means that he is not competent in that part of the MOS,
would not be able to perform that aspect of his job properly, and
would not be a competent peer-instructor. The cut-off for academic
drops in the Field Wireman Course is two retests on any task. (I
might note here that we had some concern about whether the demand
for mastery on every test would lead to an unacceptably high attri-
tion rate. We were pleased to find that when the APSTRAT model was
implemented in the Field Wireman Course, the academic attrition rate
did not increase but actually decreased by about six percent.)

After having passed all the mastery tests in a module, a student can
be scheduled for his job-performance period. An incoming student
now observes him as he performs the job. And the training cycle is
repeated with the former student now assuming the role of peer-
instructor.

When a peer-instructor's student has passed all his mastery tests
and is ready for his own job-performance period, the peer-instructor
moves on to become an administrative assistant. As an assistant, he
may perform a variety of functions. He may serve as a substitute
for an absent peer-instructor; he may screen students on the mastery
tests so that the testing load on the supervisor can be reduced; or
he may be assigned a variety of other duties appropriate to the
module. (In the switchboard module in the Field Wireman Course, for
example, administrative assistants originate calls for job-
performers.) The period of time allocated to course administrative
assistance may vary from course to course or module to module; in
the Field Wireman Course, however, one day at the end of the cycle
in each module was allocated for this purpose.

When the student completes his administrative assistance period in
a module, he goes on to become an observer in the next module, re-
peating the entire cycle - observation, skill acquisition, job-
performance, peer-instruction, and administrative assistance.
When he has completed the last module he is ready for end of course
processing and graduation.

I have not said everything there is to say about the operation of
the instructional model, but a good deal of what I have left out
will probably come up in the discussion period. But before I turn

to the way the model is phased in to an ongoing course, I want to stress again the vital importance of rigorous mastery testing in the APSTRAT model; if supervisors do not insist on mastery, the quality of instruction in the system cannot be guaranteed, for, unlike most instructional systems in which laxity in grading will not effect the way instruction itself is carried out, in the APSTRAT model laxity in testing will almost certainly assure a downward spiral in instructional quality. I think that after this brief description of the model, the reasons why this is so should be clear.

I will now describe some of the important features of the way the model is phased into an ongoing course.

Revising an entire course presents many problems that can be considerably reduced if changeover can be accomplished gradually. The APSTRAT model calls for a flexibly sequenced start-up schedule. Implementation proceeds on a module by module basis, starting with the last module of the course. The next to the last module is not started until the last one is fully primed and debugged, and is producing the desired results in a reliable fashion. Each module must be functioning successfully, then, before the next previous module is phased in. The reason we adopted this backward phasing-in process is that it permits changeover to proceed as rapidly as possible without interrupting student flow. (In the case of a newly established course, backward-phasing is not appropriate, and modules are started-up in the opposite order.) A great advantage of implementing one module at a time is that it allows course personnel to concentrate its effort and to accumulate experience with the system in such a way that what is learned in one module can be used with advantage in the next.

The way a module is primed is as follows. A cadre supervisor selects one student who has not received instruction in the subject matter of the module. He has this student observe him as he goes through the job-performance phase. He then instructs the student, as a peer-instructor would, during the student's skill acquisition period. Another cadreman administers the mastery tests. When a student has passed all his tests, he goes on to perform the job. If the student cannot perform the job adequately, the test must be upgraded, or the testing procedure must be improved. When a student can pass all the tests and can perform the job adequately, he repeats the job-performance segment with a new student observing him. He then becomes the new student's peer-instructor. All students who pass the mastery tests are retained in the module, and together with the cadre they instruct incoming students until the full flow of students can be accommodated, at which point the cadre are phased out of their instructional role. During the priming of the module,

a cadre or peer-instructor may teach two or three students at the same time to speed up the phasing in process. At an appropriate phase during the priming of the module, students who have completed their peer-instruction function can be assigned their administrative assistance duties.

This priming process is repeated in every module until the last module has been completely phased in.

The Phase 3 experimental run in the Field Wireman Course is now complete. We are in the process of writing a final report. While I will not present the data at this workshop, I think it would be fair to say that the results were positive. As a result of the pilot study, CONARC has directed that the model be implemented in the Field Wireman Courses at the other training centers. We are confident that, if the proper procedures are followed, this effort will be successful. Whether the model will work in other MOS producing courses is a matter for future research. However, the model involves extremely low risk in attempting to implement it, since its inapplicability - if it should actually prove to be inapplicable - would be discovered early in the priming phase without interrupting the flow of students or reducing the quality of output in the conventional course.

Before I conclude I would like to return for a moment to the discussion of the individualization of the methods of instruction with some observations based on our experience with the APSTRAT model.

Although our initial concern with matching instructional methods with the needs, desires, and abilities of students led us to adopt an alternative media approach, I do not think that, by giving up that approach in favor of a peer-instructional model, we were rejecting individualization. On the contrary, I believe that one of the strong points of the model is that it incorporates the main principles of individualization. This belief is based on the following analysis.

Before we ask whether an instructional method is suitable to a particular individual, we must raise two other questions about suitability.

We must ask first whether the method is suitable to the objectives of instruction: Is it a sensible way to teach the skills we are trying to get across? For example, even though some people, for the most part well educated people, can learn a remarkable amount by reading, reading does not seem to be the most straightforward way to go about learning such things as pole climbing technique and switchboard operation. The two factors that determine a method's

suitability with respect to training objectives are appropriateness of response mode and appropriateness of the training context.

Many training methods require students to perform in the wrong response mode, listening when he should be seeing, writing when he should be doing, and so on. Such methods, if they work, teach students skills that are not really useful on the job rather than skills that are. A suitable method must focus on job-relevant skills and must have the means to assure that students have indeed mastered the skills; this requires thorough and rigorous performance testing. To be suitable to training objectives, a method must re-quire the student not only to perform the responses called for on the job; it must also require him to perform those responses in their proper relation to job tasks, in a situation as close to actual field conditions as possible. This is commonly referred to as learning in a functional context.

The APSTRAT peer-instructional model calls for the performance of job-related skills in the context of actual job-tasks under simu-lated field conditions and insists on mastery. It is therefore far more suitable to the objectives of training than the conventional lecture method, with its stress on pencil and paper testing and classroom context. It is also more suitable than many of the methods we were experimenting with during the initial, alternative media phase of the project.

No matter how well matched to a students needs, preferences or abilities a method or medium may be, it is not a suitable training device if it is not suitable to the objectives of training. But the methods that get by the first hurdle with respect to objectives, must go through a second process of elimination before it makes sense to raise the question of suitability with respect to individ-ual students. Is the method suitable in terms of the practical constraints and institutional requirements with which it must cope? A training model with a good chance for implementation in a wide variety of training courses would have to keep the costs and the time for the preparation of training materials to a minimum; it would have to be relatively easy to implement; and it would have to be amenable to rapid and inexpensive modification when changes in the nature of the job or equipment call for it. As I noted earlier, one of our fundamental reasons for switching from an alternative media to a peer-instructional approach was the high cost and great time requirements of the former as opposed to the low cost and time requirements of the latter. In addition, the APSTRAT model is surprisingly easy to implement and can incorporate changed require-ments very rapidly. Of all the methods considered that were suit-able in terms of the training objectives, peer-instruction was far and away the most suitable with respect to practical constraints and institutional requirements.

Turning now to the question of suitability of instructional methods with respect to the needs, desires, and abilities of students, there are two issues to be considered. The first has to do with measures of the outcome of training, the second with the properties of methods themselves that are responsible for favorable unfavorable outcomes.

A good measure of the suitability of a method for any student is whether he masters what he is learning in a reasonable time and enjoys the process. In this regard peer-instruction has proved suitable to students across the aptitude spectrum. The academic attrition rate was lowered; students of all aptitude levels achieved mastery within the normal eight-week course span; and most students, including lower aptitude men (who generally do not enjoy training) have demonstrated a very positive attitude toward peer-instruction.

The properties of instructional methods that are frequently associated with favorable training outcomes are:

1. . Allowance for self-pacing. Because of the close relationship of the peer-instructor with his student, the peer-instructor is able to modify the pace of instruction on the basis of how fast his student is progressing. Students are neither forced to go faster than they can, nor are they held back when they can go faster. Self-pacing adjusts the rate of instruction to the needs and capabilities of the individual student.

2. Feedback to both student and instructor. The close relationship between the student and the peer-instructor provides the student with frequent feedback as to how well he is doing and provides the instructor with corresponding feedback as to how well his instruction is working. This information is also supplemented by the administration of mastery tests not at the end of an arbitrary time period, but as soon as the student feels himself ready to be tested. Feedback adjusts the flow of information to the needs of the individual student.

3. Capability of the student with regard to the medium of instruction. Most people are capable of learning in a functional context when guidance is provided in conversational form. If the student has not understood something, he can ask his instructor to repeat it, to explain it again, or to explain it in another way. A good deal of what all of us have learned throughout our lives, we have learned through the medium of one-to-one instruction in a functional context. Often this one-to-one instruction is also peer-instruction. In other words, practically all of us, regardless of differences in aptitude or educational background, are experts in this particular medium. The APSTRAT model makes such a method practicable and capitalizes on this universal expertise.

This is as far as I will go right now, but I will be glad to hear your comments and questions during the discussion period.

Thank you.

QUESTION AND ANSWER

SESSION #1A - Overview of Individualization of Instruction

Q - Mr. DeSoto - US Army Armor School

In the original APSTRAT portion it was stated that the study would
be ready about the first of October. Do you have an approximate
date or target date for setting this up?

A - Dr. Smith

Well, we were called off that task several times, largely to do
work in VOLAR. At present, our estimation would be toward the end
of November or in December.

Q - MAJ Gutzman - Fort Polk

If we are going to put this in the ATC's sometime in December, I
wonder what the training requirements for our cadre are? There has
been nothing done with our cadre, to get them ready.

A - Mr. Weingarten

Part of our concern, designing the model, was that we should reduce
the time required for retraining cadre - for orienting cadre. Our
experience with the Field Wireman Course at Ft. Ord suggests that
the cadre generally have a hostile feeling about changes of this
magnitude. The function of orientation would be to lessen that
distrust of a new thing. I don't think that orientation will do
that. It is likely to mobilize opposition. I think it is important
for the cadre to understand the nature of the job; to understand the
critical issues revolving around quality control; and get to the
point where there is a high degree of reliability in testing among
the cadre on the mastery test. That is the critical need; then
let the model do the orienting and converting.

Q - Mr. Long - University of Georgia

Concerning the reinforcing schedule or the token system, in your
work, have you come up with any plan or system where you can
gradually weed out or wean the student off the reward system to
individual motivation?

A - Dr. Smith

Individuals behavior changes in accordance with the things that happen
to them. Certainly, from a theoretical standpoint, it is possible
to move into a partial reinforcement schedule, for instance, which
probably would sustain the behavior over an extended period of time

and would thus decrease the persons dependence on the steady rein-
forcement. For the benefit of those of you who are not specialists,
it turns out that if you give somebody a reward on a pretty con-
tinuous basis and suddenly stop the reward, the behavior which has
been rewarded tends to stop. It turns out that one way of keeping
that behavior going is to reward on an irregular basis. The slot
machine, for instance, this kind of behavior which is rewarded on
an irregular basis can develop into a very definite continuing kind
of thing, but the problem is one of engineering. There are a lot
of very good ideas from theoretical formulations but to apply them
in a specific setting means that somebody has to work out all the
details as to how that applies, and develop a means of checking it
out and changing things back and forth until they get something
that works.

Q - LTC Ulrich - Womens Army Corps, Ft. McClellan

We teach advanced individual training in clerical MOS to enlisted
personnel. We have a great deal of trouble in motivational area.
Every WAC, coming into the Army RA unassigned on an enlisted
commitment for a certain type of training, winds up in clerical
training. A number of them are unmotivated when they get there;
they don't want to be there. Many of them misunderstood the recruiter
and say, "I wanted to be a medic and the recruiter didn't tell me I had
an option. I don't want to be a clerk-typist." They are disgruntled
from the first. They are taught the clerk-typist course by
programmed text at the AG School. They don't like programmed
instruction. They find it boring and tend to want to go to sleep.
What kind of motivation can you use in a situation like that? It's
very difficult to give them motivation when they don't want to be
there, and don't like the work; yet the Army has chosen to put them
there.

A - Dr. Smith

A great deal can be done on the basis of short term extrinsic
reward. What happens, after a while, is that the rewarding situation
becomes itself rewarding. In other words, I know a lady that for a
while I liked her, and it was nice to be around her, and it was nice
to see her when she came. I couldn't identify why this was or why I
felt this way toward her, except once she told me that her mother
had taught her no matter where you go or who you meet, say at least
one thing nice about them. I was aware of this and started watching
this behavior and everywhere she went, if there was a picture on the
wall she would say, "That's nice"; if you had a new tie on she'd
comment favorably on it, and the net effect was that she became, in
essence, a reinforcing figure. What I'm saying is try one of these
systems and the first thing that you will note is that after awhile
the situation itself will take on rewarding qualities.

Q - COL McDonald - Ft. Polk

Do you have any other courses that have potential for Peer Instruction in basic and AIT?

A - Mr. Weingarten

I haven't identified any specific courses. I think it is applicable in some form. My interest would be in a higher skill course and once implemented I would like to see lower aptitude people than normally are put into the course, but I have no views on where it should go next.

Mr. Crick

I would like to ask Frank Dare of the Ordnance School if he has anything to say to that question?

A - Mr. Dare - US Army Ordnance Center - Aberdeen Proving Ground

I am very impressed with the operation of APSTRAT, but have certain reservations and we at the Ordnance School are looking very closely at the answers. Initially, we are interested in how it would relate to the motor skills.

Q - COL McDonald - Ft. Polk

My question is directed to Dr. Smith. I just finished a basic training plan for 18 months trying to wrestle with the problem of motivating basic trainees and trying to reward performance. The attitude of the trainee we are getting in the Army today is a reflection of the attitude of the general public. Generally, I found out that the majority of the trainees consider their draft into the Army for two years an interruption of all the things they would like to do; working, going to college, etc. Trying to take away something that they had for 20 years and reward them for good performance. I think that's the problem. I wonder what we can do about the problem.

A - Dr. Smith

One thing that I do know about, and the kind of schemes I was talking about, is that it's a long way from the theory to the practice. For instance, one of the things you have to do is discover what it is the troops want to do. What you want to use for rewards. This can be somewhat slippery. For instance, a number of years ago the HumRRO people at Ft. Ord ran a little survey in which they identified a whole set of possible rewards and asked soldiers

which one they would want to have. The results of this survey will
tell you that soldiers would like to have certain things as rewards.
The problem is, that if you look at another study we actually set up
a behavior modification situation the only reward that anybody really
wanted was time off. In other situations you might often find another
set of circumstances.

Q - MAJ Gutzman - Ft. Polk

I understand that November is the target date for final report from
APSTRAT study. I might ask Mr. Crick, possibly, are we going to
get something down from SESS on implementation along the lines of
a subject schedule or implementation of the module? Something in
detail for instructing our instructors.

A - Mr. Crick

Let me answer your question by giving you our milestone plan, first,
this week the Southeastern Signal School sent a TWX to CONARC requesting
certain guidance be given to the ATC concerning the implementation of
the APSTRAT concept in the 36K Course. CONARC will be coming down with
this additional guidance. Second, within a week to two weeks you
will be getting for comments a draft of the Army Subject Schedule we're
typing now. Third, as to what will you be getting as far as lesson
plans, etc., I believe your people were to pick these up when they
were at Ft. Ord two weeks ago attending the workshop. You could
start now and implement without the draft subject schedule. The
subjects within each module have been identified and will not change.
The materials they picked up at Ft. Ord point out that subject hours
have now been converted into days. For instance, the first module
has 13 days as opposed to X number of hours. But, if you don't have
what you need, please let us know and let us get it for you.

Q - Mr. Lantz - Ft. Monmouth

First, I would like to get the name of Dr. Smith's book.

A - Dr. Smith

Engineering of Educational and Training Systems - Publisher D. C.
Heath. Price $12.50.

Q - Mr. Lantz - Ft. Monmouth

In order to attract attention in any educational community, what
you do is do it faster, you do it better and with less money in-
volved. I wonder if your prime emphasis was on trying to shorten

the training period or whether you were more interested in
proficiency and less personnel?

A - Dr. Smith

Well I'm for home and mother in general, and they say you can do
one or the other by trying to raise proficiency or reduce cost.
I'm not at all sure, in a particular situation, which is the
problem. In one setting, the cost of poor performance may be so
great that, for instance, in the training of an astronaut,
there is no doubt that performance is what you are after. In other
situations performance may be adequate or you can get it to an
adequate level and then you take a look at what you can do to
reduce the cost. Emphasis on quality control is to try to get a
measure of what proficiency level you're operating at so, as you
make changes, at least you know whether or not you're cutting
proficiency when you do make changes. We've seen instances where a
training establishment will have a perfectly good program in devel-
oping the skill and somebody will institute a change and the first
thing you know, performance will start going down. Now the question
arises, "Well, how do you know?" and the only reason we knew was,
in this particular setting, we were measuring the performance and
we know what happened. In many situations where you don't have an
accurate quality control, you have people making changes at every
level in training. Establishment is making changes and if you're
not measuring you never know what the effect is.

Q - LTC Field - Quantico

When an individual learns a skill, a motor skill, by use of rein-
forcement schedule, would you care to comment on whether a reward
system could be perpetuated in the field?

A - Dr. Smith

In most of these systems, especially those in school settings. You
reward the signs of work at the learning. In other words, you
reward people working steadily at the problem of learning. Then
once he has learned the skill, he can reinstitute upon command or
order at another situation. I don't think there is any great problem
in thinking you have to feel that you have to retain a reward system
all the time, although one of the points that Skinner makes in one
of his recent books is that people have been controlling other peoples
behavior for a millennium. When they use punishment all the time,
you call them tyrants, and what they were trying to do is change
punishment or the threat of punishment as a means of control, into
using reward as a means of control.

Q - MAJ Meade - Randolph Air Force Base

Mr Weingarten, in Peer Instruction, what is the reaction of your
fast-pacer when he is called upon to give instruction?

A - Mr. Weingarten

We don't have any good data. We haven't interviewed any of the
students on this. We notice no such reluctance. People, in fact,
like to teach. It is in a sense a rewarding activity. It's, in a
sense, that the learning occurs as it does in the model because it
is followed by teaching. These students are often at the lower end
of the instructional chain for many years, and suddenly to be placed
on the upper end where there are rigorous standards being applied
and they can see their students progressing, it's rewarding to them.
I think it is reinforcing and don't think faster students feel it
is a punishment to be forced to go through this. If there were
rewards contingent on fast finishing, that would develop. There
are none in the Field Wire Course now.

Q - MAJ Meade - Randolph Air Force Base

Particularly where the student is recycled for low aptitude system.
Often the change in teacher strategy gets through and they attain
their performance objective. Do these students respond to the
teacher strategy in most cases?

A - Mr. Weingarten

For us the training episode, what happens in the instructional diade
is a black box. We know very little of what happens there. We
would have to look into it if it wasn't working well. Gross
problems of bizarre behavior for a normal individual, you might have
to look into the nervous system. For our purposes APSTRAT is working.
We haven't had to look into the diade. Since there has been a drop in
attrition and people do master, there must be a skill in changing
strategy and, in part, this is not all up to the instructor. The
student, himself, shapes the behavior of his instructor. It's a
two way feedback situation. A very intimate one. I believe,
although I don't know, that the student does as much shaping as the
instructor does of what happens during the instructor period.

Q - MAJ Meade - Randolph Air Force Base

Has the group graduated that was under Peer system?

A - Mr Weingarten

Yes, they have.

QUESTIONS AND ANSWERS

SESSION #1B - Overview of Individual Instruction

Q - Dr. Fry - Ft. Bliss

I did an experiment where students would ask questions. I found
that low aptitude students would ask very few questions. They had
been programmed in high school as a group to be quiet and take
direction. I was wondering if you had any trouble in this area?

A - Mr. Weingarten

We haven't had any trouble, that I have been able to observe, in
this area. We are not extremely knowledgeable of what happens in
a fine-grain way in the instructional dias situation. In terms of
the output of the APSTRAT instructional method, low aptitude men
master the skills. They must be learning, and, I imagine that
often requires them to ask questions; although I infer they must
be asking questions, I can't prove it.

Q - Mr. Freeman - Ft. Benning

Do you consider the possibility of student contract teaching
melded with peer instruction? For example, if we are working and
I have to ask him for help, then he gets points and I lose points.

A - Mr. Weingarten

We actually didn't consider it. One of our great concerns was to
get a system as easy to manage as possible, requiring as little
paperwork as possible, and as few administrative problems as
possible. We felt, in terms of a pilot study, that every time you
add a difficulty or a cost on to the package, you're weighing
down the probability of its being used. Although such a system
might have produced better results in some ways, I think in terms
of easy implementation and management, we would have had to reject
it.

Q - Mr. Freeman - Ft. Benning

I was thinking in terms of added motivation for me, as a teacher,
to get him through. You have a dual motivation in that not only
will the student accomplish it, but I, too, will get something out
of it.

A - Mr. Weingarten

Well, in part, there's some concern as to what would motivate a
person to be a good peer instructor; to want to teach someone else.

In fact, I think that the role of peer instruction was itself a
motivator for learning, that it is a reward. To be in the role
of being able to teach someone something you just learned is in
fact rewarding and requires very little by way of extrinsic
reinforcement to maintain that behavior.

A - Dr. Smith

One of the things Mr. Weingarten didn't mention is that everyone
that has been out to see this course in operation comes back
terribly impressed with the enthusiasm that the students display.
It's one of those things that is difficult to describe except by
seeing it.

Q - Mr. Squires - Air Defense School, Ft. Bliss

Did you say that once the peer instructors graduates from the
course, they actually sit through an entire course before starting
the peer instruction?

Mr. Weingarten

No

Q - Mr. Squires - Ft. Bliss

What did you say, that once they graduated from the course they then
started instructing?

A - Mr. Weingarten

No. As soon as they pass all the tests on the given module they
enter the peer instructional phase on that module.

Q - Mr. Squires - Ft. Bliss

But did you say that they actually sit through it one time in that
module until they started peer instruction?

A - Mr. Weingarten

I think maybe you are referring to the observation period. In the
Wire Department, for example, there is either a day or a half day
allocated for this purpose. This is where the man does the job that
he is going to do when he becomes a peer instructor. The new student
comes in and observes the future peer instructors doing the job.
The new student says "That's hard - I'll never learn" and the
eventual peer instructor says "I learned it a couple of days ago

and you're going to learn it because I'm going to teach it to you
tomorrow, now - this is what you do." This is called a conference;
the new student goes through this for about a half day so that
he has seen all the things he is going to learn.

Q - Mr. Squires - Ft. Bliss

Then the peer instructor did complete the module and immediately
started teaching?

A - Mr. Weingarten

Yes

Q - Mr. Squires - Ft. Bliss

For the cadre type instructor, what was the difference in their
preparation? Did they complete the whole course and then start
teaching, or, did they receive additional instruction before they
taught?

A - Mr. Weingarten

The cadre received very little instruction or orientation. Now, let
me say, one of the problems in putting a new training system into
a course is the phychological or socialogical inertia resistance and
hostility. We are concerned on how to deal with this. We con-
sidered orientation periods and even conducted some without anybody
on the APSTRAT staff thinking we were successful. We rejected the
notion of extensive orientation, because I think, although we have
no evidence to support this, orientation for people with initially
negative dispositions, rather than changing that disposition, rein-
forces it. You tell them the reasons why you think this is better,
and they tell you the reasons why it is worse. They are pretty
ingenuous and you can't beat them at it. The important thing is for
them to learn their functions. They don't think the system will work
and will probably be very rigorous in the quality control or job
testing procedures; but, that is all to the good of the system. I
also must say that in the first stage in the initiation of the system,
we had one advantage of being in the first wave that the other
training center won't have. The tests were produced by the 36K20
Course personnel. They designed the training modules under our general
guidelines, but they allocated equipment in their own divisions and
very soon it became their own baby. Their familiarity with the
processes that went into organizing the systems, was in a sense,
their orientation.

Q - Mr. Squires - Ft. Bliss

May I ask one more thing? Did you offer any sort of intrinsic
rewards or values that substantiates what Dr. Smith said; that
people react to physical type rewards rather than psychological?

Dr. Smith

I didn't say that.

Mr. Weingarten

Together with Skinner's approach, to apply a stimulus reinforcement
after some activity, there is the pre-mach approach. People who
have preferred activities can engage in this preferred activity
after they complete a certain task. That preferred activity is a
reinforcer of the other activity. I believe, that there is an
intrinsic reinforcement in teaching, for some people maybe once in
a lifetime, of being on top of the situation. Proof of your own
mastery, the ability to teach someone else, is something of value.

Q - Mr. Squires - Ft. Bliss

Maybe you can try this at Ft. Bliss because we have really been doing
your system for fifteen years and as soon as a person graduates from
our course, 60% of our instructors come out of that graduating class,
he immediately goes back and to instruct and he is unhappy in his
job. We don't get that from our instructors; they don't want to be
instructors. That's a lousy assignment. I don't know how it is in
the rest of the schools.

A - Dr. Smith

One of the differences is that this becomes their job, their
assignment, this is not these peoples assignment. This is a one
time kind of an activity. That may make all the difference in the
world.

Q - Mr. Freeman - Ft. Benning

I have a question on that too. Everyone instructs, in other words,
you don't screen these peer instructors, but they all instruct?

A - Mr. Weingarten

Ideally, everyone instructs. We don't screen them, partly for the
reason that I mentioned before. We don't want administrative
difficulties of people looking up peoples AFQT's and matching them

and also negative side effect of that procedure. We just wanted something where you could say "Here is a man who knows the task and here is a man who doesn't" and put them together. This one turns out of the black box knowing the assignment is random and, ideally, everyone teaches someone. One of the presuppositions of this procedure is that there is an even flow of input so that there can be maintained a one to one ratio. We have provided for the possibility of an illness of a peer instructor by this administrative assistance period. In fact, the flow is often not regulated so that any innovation in training is likely to call for supportive changes in the support system. Some of those don't come about very rapidly. One person can easily teach two or three people. The experience of being an instructor is somewhat more important than the experience of having a one to one instructor while you are learning. There are times when we had idle instructors and there are times when instructors have to teach more than one student.

Q - Mr. Welford - Ft. Huachuca

How did the model program change your student/equipment ratio compared with the conventional program?

A - Mr. Weingarten

It didn't. We have a certain amount of equipment and we designed the model to be flexible with the amount of equipment that exists. If any course is up to the stipulated level of equipment and personnel the system can work. It can even work below those levels. It happened that there was no increase in equipment except in two items, field wire and poles. Poles had to be replaced faster and there was a need for more field wire because of the emphasis on practical application.

Q - LTC Meredith, Office, Chief Research and Development, Wash, D.C.

I would like to go back to a couple points and put them all in one outside observers point of view. I was one of those visitors out there to see APSTRAT in motion. Go back to the first two questions, one of language and one of motivation. You don't need to motivate the student because he seems to get his motivation from looking at another GI like himself. That carries him through. You don't need to motivate a peer instructor because some of them say for the first time "Gee I didn't know that I could learn this and now I'm going to teach it". The language is not a problem because he's not being asked to communicate with someone in a position of authority or higher education. They use rather gutteral terms sometimes to communicate with each other in reflecting upon the other's answers,

but the message gets across. When you talk to the cadre instructor, you find that once they've gone through one of these cycles or more, they become the best advocates of the program so far. They like it because it gets them off the platforms, it gets them away from a 50 minute prepared text where an instructor is sitting in the back of the room watching him, as I've seen here for the past couple of days. It gets him down among the students as a quality controller and he can tell you at any one time and point who the students are that are having trouble. He couldn't do that from the platform before. So the sales point is that they and those who work with it including the students themselves, are all for it.

Mr. Squires - Ft. Bliss

This is very interesting to us at the Air Defense School because we are faced with a similar situation right now and that's why I pushed earlier on this. This seems to go against the grain of perhaps a tried expression that we've always used in education that you never teach as much as you know. If you only have one level of knowledge and you expected to teach that very same level to the people that are following you, that's extremely difficult or impossible to do, and yet, you seem to, on the basis of few cases, have substantiated that you can do it. We have a problem now in our multi-level training that we inaugurated a couple years ago at Ft. Bliss. We have been sending people out on site for more than a year now that were trained to an exact entry level position with no knowledge of theory of an electronic component. All they had been taught is to switch that thing. If it doesn't work, change the chassis. They have a troubleshooting guide to even tell them which chassis to switch. We are getting an awful lot of reports back from the field now, perhaps some of them not valid, perhaps some of them valid, saying that, when we had more highly trained technicians on site they could OJT these entry level technicians. Now we've reached a point when all we have on site is entry level technicians with additional entry level technicians coming in behind them, and, how in the world do you expect that entry level man to teach another entry level man as much as he knows himself? We're having a problem right now.

A - Mr. Weingarten

You could up-grade what they define as entry level standards at the output of training, but I'm not confident of the ability of a man to teach another man a skill he just learned except in the context of very tight quality testing control. I don't know whether you could send him out on the job, confident that he knows his job, unless

there was a tight quality control. Unless there is a tight quality control, it is not likely to happen.

Q - Mr. Freeman - Ft. Benning

It's very ego shattering for instructors, I bet. What do you do with all of these instructors that you turn out to pasture?

A - Mr. Weingarten

They test. They are the quality controllers. This is a very important point in the model. I think that any self-instructional model, or any model that frees the instructors, requires thorough performance testing. To do thorough performance testing takes time and under this model the use of peer instructors frees the cadre for this thorough performance testing.

Q - Mr. Boyd - HumRRO - Ft. Rucker

Do you occasionally find someone who fails in the instructional mold and simply can't bring his student up to the minimal level?

A - Mr. Weingarten

Well, there are students that fail and this is a weak point in the design. There is no set procedure. Often a regular instructor, in those rare occasions, will say "I think it's because of a personality conflict, or a language problem" or something of that sort, and will assign another peer instructor. Generally it doesn't happen, we find that most men can teach each other.

Q - Mr. Miller - Naval Air School Command - Pensacola, Fla

Your talking about hands-on training primarily in performance testing. Do you have any thoughts of how this would work in a more academic subject dealing with more abstract and theoretical type material assuming that it did have units of instruction?

A - Mr. Weingarten

I have no reason to think it won't work. I think there are certain limits to where peer instruction will work but not in terms of the nature of the skill involved. I think it won't work in heavy practice. It's not efficient in skills like typing. There is no sense in having someone sit behind someone else and watch him type. Another example is Morse Code. I think there will be some difficulty in using the model where the range of possible right responses are too large so that nobody has to make all these

IV-37

responses, and he qualifies if he makes the right response. How is
he to judge if somebody else has made the right response, if it's
another response? I think those are the two areas where it won't
work.

Dr. Fry - Ft. Bliss

In the leadership area we are teaching group problem solving in a
group of six people that are all peers. The instructor and myself
removed ourselves from the situation and let them set the standards,
lay the performance, and teach. A critique from a peer is a lot
less devastating than from an instructor.

Q'- Mr. Ling - University of Georgia

Dr. Smith, this refers to your example of behavior modification.
With children, what is the basis of their motivation or their
success in learning? Is it the acquisition of points, to do what
they want to do, or are they motivated by the positive effects
they get from working with adults and the feeling of hope and good
will that the teacher exhibits toward the student for doing good
work?

A - Dr. Smith

Well, number one, I gave examples of situations which had been
engineered to get certain results. These are not the only ways
to engineer these principles. One of the things you find is that
children can receive reinforcement from adults who praise them,
who are affectionate towards them, and so on. In fact, one very
simple technique for reinforcing small children is to just look at
them. This has been shown in a couple studies that I have read,
that if you have small children, just looking at them is reinforc-
ing. Now, the problem you do get into is, that in the public
schools, teachers rarely, dispite all the talk about human warmth,
praise their pupils. Probably one of the more extreme cases I
read about was that the number of nags and criticisms were counted
versus the number of times the pupils were praised and the count
was something like 743 nags to 1 praise. In HumRRO's work, which
I mentioned earlier with public school teachers, we paired teachers
so one would teach while the other one watched. Again we found
that teachers would not use praise. So we gave each teacher 50
M&M's. She was told every time you praise one of the children, give
them an M&M. At the end of the hour the teacher still had a hand-
full of M&M's and suddenly we found that we had a nice little
proficiency test in praise. She had gotten through the whole hour
without having praised anyone.

Mr. Freeman - Ft. Rucker

On his comment I think he needs to differentiate between extrinsic
motivation and intrinsic motivation. I think he was leaning towards
the intrinsic motivation. After you gradually remove the M&M's
you get into the desire to be accepted by adults and so on which are
possibly intrinsic motivators.

Dr. Smith

Well, from a more technical sense, what happens is, that you may
start out using some extrinsic reward but, in general, rewarding
circumstances tend to develop rewarding properties. An example of
this, that I know, is a woman who was a member of a bridge club my
wife was in and everybody thought and reacted to her as a really
charming woman, and it was very pleasant to be around her.
Nobody was conscious of why, until one day she happened to mention
that her mother had taught her that every time she met somebody
and went into their house, she would say something nice about them,
their house, their clothes, etc. So every time she came into the
house, there was a picture that she liked, I had a new tie and she
liked it. Nobody was aware that she was doing this all the time,
except the reaction was that it was nice to see her again. This
same way, rewarding situations can develop rewarding property.

Q - Mr. Freeman - Ft. Rucker

I have one other question. Sometimes it takes a good bit of in-
telligence and analysis to find out what turns a person on. What
is the motivator for Joe Doe? What have you done in your guidance
to command to warn them that everybody isn't going to like M&M's
or three day passes or the usual.

Dr. Fry - Ft. Bliss

I would say that the first thing you do, if you want to set the
program right, is to go out and identify the incentives that
appeal. I recently heard a story that was somewhat humorous. The
teacher observed that frequently the students were over by the
window killing flies and it occurred to her that possibly that
might be a reward, so she talked to the students and yes, indeed,
it was. They would learn their lesson and do everything right if
they could kill flies. So what you may think is a reward, the
student or officer may not.

Dr. Smith

There are some other circumstances, too, where you can ask students
what will be a reward, and they'll tell you, and you'll set them
up and they won't take it. We had an example of that in the HumRRO
experience in which some people in our division in Monterey de-
veloped a survey in which they asked soldiers what kind of
rewards would they like, and so, we had them all ranked. Well,
later on we tried to use behavior modification techniques in
another circumstance and we put all these things on the list of
possible rewards, but it turned out that nobody wanted any of them.
All they wanted was some free time.

Mr. Weingarten

I think there are rewards like free time and money, that are
generalized reinforcers. Free time means, essentially, an unidenti-
fied unspecified activity of some sort. I think that in general,
the generalized reinforcers that the Army has available is free
time and money. Money is harder to work than free time. Free time
I would say is probably the safest.

Q - Mr. Squires - Ft. Bliss

Dr. Smith, I think you made a statement that the purpose of tests
in individual instruction is to measure the students performance
and to measure the instructional system or something of that
nature. Is there any reality or difference in these two purposes?

Dr. Smith

The kinds of tests would be the same in both instances. What you do
with the test results afterwards would be quite different.

Q - Mr. Squires - Ft. Bliss

You do then, I'm trying not to put words in your mouth, if you
measure a student's performance. Isn't that in reality a measure of
the instructional system? The instructional system is to see that
the student performs properly?

Dr. Smith

Yes, that's correct, however, if you are measuring the student, then
you use these test results to make decisions about the student. If
you're measuring the course then you would begin to summarize the
test results from a number of students. You would then take those
test results and make some judgement as to whether or not the
course needed changing. The processes you go through in this
regard are different.

CLERK, CLERK-TYPIST, PERSONNEL SPECIALIST, AND KEY PUNCH OPERATOR TRAINING

Donald F. Vaughn, US Army Adjutant General School

The purpose of this briefing is to acquaint you with the self-paced method of instruction developed by the US Army Adjutant General School, and to provide an up-to-date report on the status of this program in terms of progress and objectives. The Adjutant General School is proponent for Clerk (MOS 71B10), Clerk-Typist (MOS 71B20/30), Personnel Specialist (MOS 71H20), and Key Punch Operator (MOS 71U20), advanced individual training. In October 1966, the AG School was initially given the responsibility of developing and testing a self-paced system of instruction. The purpose of the project was to determine if trainees undergoing · advanced individual training in the basic Army administration and personnel courses could be taught effectively, the basic skill requirements in the aforementioned areas by using programed instructional techniques. From December, 1966, to June, 1969, programed instructional texts and their related materials (tests and packets) were developed by the Department of Non-Resident Instruction, AG School. These courses were tested at the Basic Army Administration Course, Ft Knox, Kentucky. The test phase proved to be successful and the program was approved by CONARC. In July, 1969, the self-paced program was introduced into seven US Army Training Centers. The program is currently operating in six USATC's, and they are as follows: Fort Jackson, SC; Fort Knox, Ky; Fort Dix, NJ; Fort Polk, La; Fort Leonard Wood, Mo; and Fort Ord, Ca. The program is also being used at the WAC School, Fort McClellan, Al. MOS 71U20 is taught only at Ft Jackson, SC, and Fort Ord, Ca. Our program is a systems engineered program that has enabled the student to be an active participant in the learning process by requiring active response while providing immediate feedback. The PI program is performance oriented, and is based on how much learning the student can manage at one time. When I say the course is performance oriented, I am referring to end-of-course testing, as well as to classroom work.

1. <u>Background of Programmed Instruction.</u>

   a. Programed instruction texts are self-contained learning experiences. The tests are designed to take maximum advantage of civilian-acquired skills and individual abilities of trainees. In converting from the conventional method of platform instruction, the AG School faced a monumental task of revising the instructional content so that the process might cover all the technical subjects related to the field of administration and personnel. Administration and personnel management subjects for the Basic Clerk, Clerk-Typist, Personnel Specialist, and Key Punch Operator were developed to make frequent and explicit use of the training cycle.

The present program for these four MOS's contains thirty-two programed instructional texts, and are designed for enlisted men and women who have completed BCT and are just beginning their Advanced Individual Training (AIT). The student rate of progression is controlled by evaluation of his performance on each successive technical subject area, together with his increasing proficiency in typing skills.

   b. Description of self-paced courses.

      (1) Clerk-Typist (MOS 71B10). This is an apprentice level specialty training where the student is taught beginning typing and certain other basic administrative duties. Some tasks taught in the following subject areas are:

         (a) Preparation of correspondence.

         (b) Maintaining the unit functional files system, DA publications.

         (c) Teaching beginning typing (must type 20 WPM).

         (d) Preparation of routine orders and morning report.

Graduates of this course go on to other training center courses for which the AG School is responsible, to service school courses, or to assignments in MOS 71B10. Civilian education, job experience, and typing ability are considered in selecting personnel for each training center course, as well as for the service school courses.

      (2) Clerk-Typist (MOS 71B20/30). Provides a typing skill of 30 NWPM and teaches the student to accomplish administrative requirements essential to organization/activity operations in support of the Commander's mission, such as:

         (a) Mail and distribution operations.

         (b) Maintenance of files, records, and publication sets.

         (c) Preparation and dispatch of correspondence and messages.

      (3) Personnel Specialist (MOS 71H20). Provides instruction that teaches the student to perform administrative requirements pertaining to:

         (a) Classification and assignment,

         (b) Maintenance of personnel records.

(c) Personnel management.

(d) Personnel actions in support of the Commander's mission.

(4) Key Punch Operator (MOS 71U20). The purpose of this course is to technically train and qualify a student to perform tasks as a key punch operator on the IBM 026 printing card punch. Soldiers who successfully complète the training and punch a minimum of 4200 alpha-numeric strokes per hour with an error rate of 4.percent or less, are awarded MOS 71U20. This standard of alpha-numeric strokes is based upon CDC-MACRIT studies.

c. Self-paced individualized instruction differs from group-paced instruction in many ways.

Individually-Paced Instruction	-vs-	Group-Paced Instruction
Is self-instructional		Is platform oriented
Requires immediate response		Encourages passive attitudes
Provides immediate feedback		Provides delayed feedback
Established specific objectives for students		Provides general objectives for group
Performance is constant, time varies		Performance varies, time constant

2. Findings Under The Self-Paced Instructional Program.

a. The self-paced method of instruction has proved to be capable of training individuals much more efficiently than the conventional lecture method. Comparisons between conventional and self-paced methods of training reveal that self-paced students, on the average:

(1) Were capable of a higher level of proficiency in the performance of selected MOS related tasks under simulated job conditions including typing,

(2) Require more training time to complete 71B10 training,

(3) Could be trained as 71B20 in substantially less time,

(4) Who were trained in 71B10-71B20-71H20 could be trained in less than the conventional 8-weeks time frame, and

(5) Could be trained in a significantly reduced investment of man-days of training.

Average Completion Time by MOS

MOS	MOS Title	Conventional	Self-Paced
71B10	Clerk-Typist	4 Weeks	4.7 Weeks
71B10/71B20	Clerk-Typist	8 Weeks	4.7 Weeks
71B10/71H20	Personnel Specialist	8 weeks	6.2 Weeks
71U20	Key Punch Operator		4.7 Days

b. **Increased Proficiency of Trainees.** In order to achieve and maintain a high standard of efficiency in the self-paced program the guidelines set forth by the Army Subject Schedule must be adhered to. This course control document prescribes student progression through each of our 32 programmed texts and the typing program. This is accomplished not only in narrative form but also graphically through the medium of flow charts and logic trees. Programmed instruction, as opposed to conventional teaching, should result in an increase in quality of graduates. The quality of a graduate can be best determined by actual performance on the job. Motivation, attitude, and technical skills constitute job performance. We have found through experience that students possess a better training attitude because they can identify and associate the technical subjects with actual work requirements. Further, the student progresses faster because he has been entrusted with the responsibility of his own training. An additional motivational factor is the student's personal knowledge that up to 50 percent of the E2's in their class can be promoted to E3 upon successful completion of the self-paced training.

c. **Savings in Money and Training Time.**

(1) Self-paced instruction has resulted in a decrease in training costs as compared to conventional instruction. We made this determination by comparing student training time under the self-paced and conventional methods of instruction and computing the man-weeks of training saved.

Conventional/Self-Paced Clerical Training (ATC)

(FA 71 Programmed Input)

Skill	Tng Time Conventional	Avg Tng Time Self-Paced	Average Man-Weeks (Additional) Saved
Basic Clerk-Typist	4 Weeks	4.7 Weeks	(6,101.9) Man-Weeks
Advanced Clerk-Typist	8 Weeks	4.7 Weeks	46,292.4 Man-Weeks
Personnel Specialist	8 Weeks	6.2 Weeks	28,990.8 Man-Weeks
Key Punch Operator		4.7 Days	

Total Man-Weeks Saved = 69,181.3

3. General Comments.

    a. The texts, exercises, the tests used in the self-paced clerical training were developed by the AG School. Our programmed instruction texts are continuously reviewed and updated as required, partly as the result of personal contact with instructors and students during visits to training centers. Recently we designed four new PI texts for the Key Punch Course and plan to have them ready for use this month. All our texts are tested on representative groups of trainees before being approved. The texts are printed at the Ft Benjamin Harrison printing plant and are distributed to the training centers semi-annually. As techniques have been improved and materials have been refined, the printing costs have been reduced substantially from $150,000 in FY 70 to approximately half that in FY 71. We anticipate a further cost reduction in FY 72, only part of which will result from lower trainee input. All our texts are designed to be reusable, and this system has also reduced our training costs.

    b. Our programmed texts are available for use by Army units conducting initial and refresher training. In addition to having filled requests from ROTC instructor groups and reserve and National Guard units, we have sent PI texts to many of active Army commands in CONUS, and overseas.

4. Problems Encountered in the Self-Paced Program.

    a. Lack of responsive assignment instructions when the individual student has completed self-paced training. Public Law No. 51 is also restrictive in overseas assignment utilization.

    b. Frequent changes in DA policies and the subsequent changes in regulations require continuous updating of the PI texts.

    c. MOS (71H20) - Personnel field contains many specialized areas making it difficult to prepare PI texts that will adequately train the student in all facets of MOS related duties.

5. Self-Paced Training Projects.

    a. Complete systems engineering of the self-paced training program.

    b. The development of diagnostic test that will assist in predicting student completion time in the self-paced program.

    c. The development of a post graduate questionnaire that will provide continuous feedback for updating courses.

d. Preparation of a diagnostic test for English grammar.

e. Creating a standard orientation pamphlet to introduce the self-paced program to new students.

f. Currently in the process of developing a series of cartoons relating to the specialized subjects. These cartoons will be added to PI texts in an attempt to make the text more interesting and generate student enthusiasm.

6. Conclusion.

Let me conclude this briefing by telling you that the AG School is well satisfied with the self-paced program of instruction. We feel that self-pacing can fill a significant part of the Volunteer Army's training requirements by offering individualized instruction, allowing an individual to progress at a faster pace, and by providing him more meaningful performance testing.

COMMON BASIC ELECTRONICS TRAINING (COBET)

Mr. Charles Anderson, US Army Signal Center and School

First, Gentlemen, a brief review of the history and rationale of
project COBET. The acronym, COBET, means Common Basic Electronics
Training. The project began in 1966 as a result of some DOD
guidelines distributed to all the services. The most essential of
these guidelines was that entry level electronics training courses
should be structured on a functional, equipment-oriented base
rather than on a conceptual or theoretical base.

The Signal School was then given the job in Mid-1967 to translate
the DOD practical training philosophy into a Basic Electronics
Fundamentals Course that would be compatible with all the electronics
repair MOS courses throughout the CONARC system.

The project is governed by CON Reg 350-13, which clearly defines
The Signal School mission in developing, trying out, and evaluating
the COBET course.

The original CONARC mandate directed that we develop the COBET course
for 74 different electronic equipment repair MOS courses in 10
different CONARC schools distributed throughout the CONUS area.
As you can see here, since that time, this number of MOS courses has
increased to 85. I'm sure you can appreciate that it is difficult
enough to structure a common course for just MOS courses in our own
school, but when you have to do this for more than three times as
many MOS's in 10 different schools, your problems multiply proportion-
ately.

How did we meet the challenge? Well, we were fortunate at the time
of our original analysis to have the benefit of two essentially new
curriculum development processes then in the making: First, the duty-
oriented objectives approach which later became systems engineering
of training, and, second, the functional context process. These two
curriculum development systems told us in the clearest terms that,
even though we were dealing with fundamental electronic concepts,
we must seek out the MOS job requirements as a basis for deriving
our common course content. We were, in effect, seeking a detailed
answer to this rather simple question: What skills and what
enabling knowledges does a future repairman need to pursue further
training in the equipment phases of his MOS repair course?

Our first step was the job analysis phase in which we conducted a common circuit survey covering all the equipment taught in the 74 MOS courses ... not an easy task since the equipment ranges from a simple handie-talkie to sophisticated missile guidance equipment. Nevertheless, we felt it was critically important that we identify all the major circuits which are common to all the equipment. After all, the final step in any repair process is to either replace a component in a bad circuit or to replace the circuit itself with a new one. We found that there were some 186 major circuits common to equipment.

The next step was task identification and selection. We had to find our just what tasks repairmen would have to perform on these 186 circuits. So we sent a questionnaire to all the MOS courses and asked them to identify the tasks for us. The results of the common circuit survey told us that, out of the 186 major circuits, there were some 45 circuits that were most common to all the equipment. We then used these most common circuits to design and develop the 10 different training chassis listed here. These 10 chassis represent the "hands-on" equipment backbone structure of the COBET course, and they provide a modular course structure that allows for "peel-off" after a student has received sufficient training to prepare him for entry into his MOS course. We have worked out and coordinated phasing schedules with all the MOS courses involved.

Now I want to give some attention to the "functional context" aspects of the COBET course development.

First, let us take a look at the training chassis being used in this functional context approach. The chassis used in the first module of the course is a conventional regulated power supply, admittedly much larger than what we find in today's modern equipment. We decided that an entry level student should begin on something that might be larger than life-size. As the student progresses through the training modules, the chassis will be reduced in size until they more nearly approach miniaturized modern equipment. For example, there are three units used in the first three modules. The amplifier unit used in the second training module, and the oscillator unit used in the third training module are half the size of the first one. The solid state miniaturized pulse generator chassis to be used in the 4th module contrasts in size with the power supply used in the first module.

Now, since by direction from CONARC, the COBET course will occupy 75 percent of the student's time in "hands-on" training it was almost automatic for us to use the functional context approach in deriving our training objectives and related skills and knowledges.

To insure a valid functional context approach in which the student gets needed theory only when he needs it, and only in the proper amount, we use a rather painstaking derivation process. Briefly, it works this way: we begin with the performance objective which is really the key to course content, media, and evaluation. We then concentrate on the task portion of the objective. We subdivide each task into action elements. We then identify the skills needed to perform the action, and the final step is to identify those theories, concepts and knowledges which will enable the student to perform the skills. We believe this represents a valid functional context approach; thus, the COBET training course is functionally contexted to the major circuits in 85 tactical equipment repair courses. This means that individual COBET lessons can be integrated (in what we might call a fractional functional context approach) into any of the 85 tactical repair courses and as we update COBET lesson materials to keep abreast of new tactical equipment, the COBET lessons will be even more suitable for integration into all ongoing MOS repair courses.

Now let me move on to the methodology we are using to conduct COBET training By direction from CONARC we are obliged to conduct the course on an individually-paced basis. This means that we have to select the most appropriate learning environment. To best accomodate individually-paced, "hands-on" training. We began with sketches of what was required. Then we made cardboard models; and, finally, we decided upon the circular COBET site (meaning student instructional training environment) complex. That the plan calls for centralized instructor control of twelve individual student carrels. We now have two of these COBET site complex units operating at The Signal School.

The instructional media that we use in these carrels consists of a variety of audiovisual media and printed instructional materials. For example, for each of the training chassis we use what we call an equipment manual designed to be equivalent to the conventional technical manual. This Equipment Manual No. 1 is used for the power supply chassis. The equipment manual is modeled after conventional technical manual. We feel that this use of field type instructional material reflects the functional context approach.

We also use programed instruction texts and laboratory worksheets. But the principal medium of instruction is the audiovisual device, the 16MM film loop audiscan projector. We are also using a 35MM audiovisual projector to validate our lessons prior to finalizing them into 16MM film loops.

Now you have a general idea of what COBET is, how we are developing and conducting COBET training.

Now what about results so far?

Since formal COBET training began in January, 1971, we have conducted a formal evaluation while we were training more than 400 students in both the self-paced mode using the site complex and in a group-paced or lockstep mode.

Just a word about the lockstep mode. At present we are using this as an interim mode conducting part of our COBET training while we are having self-paced instructional materials prepared under contract. Also by using this mode, we have been able to compare the self-paced and lockstep modes to determine whether there is any time-savings. With an admittedly small sample, we have shown a 28.3% time savings for the self-paced mode.

Other important statistics from the evaluation study will be published by the end of October. It shows a comparison of results for COBET self-paced, COBET lockstep, and conventional instruction.

I have given you only a quick look at the results because the final statistics are still in preparation.

Finally what about the COBET future? We are continuing the development of COBET training and will have modules 1, 2, 3, and 4 in full operation by January, 1972. Also COBET is planned for implementation at the US Army Ordnance Center and School at Aberdeen Proving Ground early in 1972. We are working closely with them to help them get started. Also there is a plan still being discussed at the CONARC level to try COBET out at an Army training center starting in July 1972. The decision for this is still pending.

Well Gentlemen, that's the COBET story to date. Thank you very much.

QUESTION AND ANSWER

<u>SESSION #2A</u> - Utilizing Individualized Instruction in High Density
Army Courses

<u>Q - Harold Hunter - HumRRO</u>

I have a question for CPT Vaughn. You mentioned you have a problem
in regard to receipt of assignment. Can you tell me what was the
nature of the problem?

<u>A - CPT Vaughn</u>

The assignment instructions for AIT personnel generally get down
around, or are supposed to get down around, the fourth week but
usually ends up the sixth week. By the time the instructions are
printed on orders and distributed, they usually get to the company
and the student around the end of sixth or seventh week. Now if
the student completes the program in say three of four weeks, it
means a long period of time between the time he completes the
program and the time he receives orders. So to keep his time from
being a complete waste, the training centers have implemented an
applicatory OJT program where the student is utilized in the clerical
and administrative field during that time. It's time not wasted, but
time spent for further training; however, we don't identify it with
the same apprentice type OJT, but call it applicatory training.

<u>Q - Not identified</u>

What percentage of your students receive CONUS assignments?

<u>A - CPT Vaughn</u>

Are you referring to Public Law 51 that prevents the student or
serviceman from being shipped overseas prior to 16 weeks training?
I don't have the figures on how many of our assignments are overseas.
It varies right now with the withdrawal from Vietnam. Mr Sherrel
can you give me a figure on that?

<u>Mr Sherrel</u>

At one time about half; but right now, they're cutting down. It was
a fair magnitude that sometimes we worried about.

<u>Q - Not identified</u>

Do your 71B10's mostly go on to follow up training right there?
Say you've got 71B10's feeding into 71B20.

A - CPT Vaughn

Well, as I said, our 71B10 is a prerequisite MOS into the other
areas. For instance, if the student is selected to go into 71H20,
Personnel Specialist, which is conducted at Ft Ben Harrison, then
he is assigned on the initial assignment. We have quotas that
the Army Training Centers must fill, for example, to the Finance
School, Chaplains School, and Fort Hamilton, these quotas must
be met so 71B10 is shipped out and I can't give you a figure of
what percent is staying at post because it varies.

Q - Mr Dare - US Army Ordnance School - Aberdeen Proving Ground

Are the students in any of your courses, particularly clerk-typists,
allowed to use the facilities other than normal duty time?

A - CPT Vaughn

At Fort Polk, I use that because I used to be there, they have a
required study hall for those students that are learning to type.
Those students, coming into their course not knowing how to type or
if they are a slow typist or slow learner, go into their study hall
in the evenings to practice in order to increase their typing ability.
This would be during other than normal duty hours.

Q - Unidentified

Do you use the electronic beeping on your slides (on your casettes)?

A - Mr Anderson

Yes, it has a 1500 Hurtz signal for stop or advance.

Q - Mr Dare - Aberdeen Proving Ground

Who does your photo reproduction?

A - Mr Anderson

A contractor, Ken Cooke Company, Milwaukee, Wis. However, many
people are doing it now and I can give you other addresses later on.

Q - Mr Wallace - Navy Dept

What is the name of the audio device that you have up there? (At
the US Army Signal Center and School)

A - Mr Anderson

Audio Notebook? That's the name of it Audio Notebook.

Q - <u>Mr Wallace</u>

Who manufactures it?

A - <u>Mr Anderson</u>

A company up in North Haven, Conn., Electronic Futures Inc. (EFI)

Q - <u>Mr Wallace</u>

Are your own in-house people capable of putting material on these tapes?

A - <u>Mr Anderson</u>

Yes, we have no contract on that. We do it ourselves. However, EFI has a fantastic arrangement to do that in multiple, something like thirty at once. We have bought a device from them where we can do six at once.

Q - <u>COL Sanders - United States Marine Corps</u>

Who manufactures the small viewing device that you use for your COBET instruction?

A - <u>Mr Anderson</u>

Are you talking about the Audiscan projector - the 16mm device?

Q - <u>COL Sanders - USMC</u>

No, it's about 8" x 10," looks like a little portable TV set, and is used with the audio.

A - <u>Mr Anderson</u>

Sir, we don't have anything like that that I know of; you may be talking about a super 8 device. We have the Audiscan projector that I showed you.

Q - <u>COL Sanders</u>

I went over to your classroom earlier and I'm talking about the equipment used there.

<u>Mr Crick</u>

Sir, we'll get you an answer on that. If you will see the gentleman with the headset on (Mr Hattman) I believe that is in his course.

IV-53

<u>Dr Smith</u>

I think the AG School is to be congratulated on the amount of work
and the kind of savings that they have demonstrated. They mentioned
an up-dating problem. HumRRO has done some work with the Quarter-
master School which may be of assistance in the up-dating problem. We
have developed a feeder program which provided indexes to the forms,
regulations, and manuals for every lesson; when one of the regula-
tions or forms changes the program will identify it for you, every
single lesson in which that form or regulation has an affect. Now
I don't know if that program works for equipment, but it seems to
me a fairly straightforward application to keep up with equipment
changes. The work on COBET shows a great deal of imagination.
There's one aspect of the functional context that I'd like to stress;
that is, it seems to me that there needs to be some careful coordina-
tion between the COBET work and the equipment course of which that is
to be a part. Part of the functional context is that you start out
by giving the student a thorough orientation on the total job for
which he is being trained. Then you systematically tie in each
particular part of the course to the various duties and tasks which
would be performed. I think some stress should be placed on this
kind of coordination. Another point is that COBET, as stated by
Mr Anderson, is based on existing manuals. Now research work done
by HumRRO, and more recently by the Air Force, has very clearly shown
that appropriate kinds of job aids can make a lot of difference in
getting job performance. Some of our work has shown that it's quite
possible to make major reductions in training time by getting the
manuals to do a lot of the work of providing specific information;
on-the-job study for people who have to perform various job tasks.
Then, when you orient your training around efficient manuals, you
suddenly discover that a great deal that you use to have to teach
your student you no longer have to teach him in order for him to do
a competent job.

QUESTION AND ANSWER

SESSION # 2B -- Utilizing Individualized Instruction in High Density
Army Courses

Q - Mr Wellford - Ft Huachuca

What can we do to guide CONARC into changing their concept of
establishing the COBET program in the training center to come into
a more functional context approach in training? I can see in our
SOLAR course, for instance, a man doesn't need logic circuitry
until the 28th week of his hardware phase. This means he will have
gone through 10 or 12 weeks in whatever your program turns out.

Mr Anderson

Not necessarily - You tell us how much of that ten weeks you want
him to have.

Mr Wellford

Well okay, he's got to get all in logic circuitry which, is,
apparently, the last block you are going to give.

Mr Anderson

It would be if you wanted him to get it.

Mr Wellford

Okay, he's been through that, and he's been through 20 some odd
weeks of all these other things and now is the first time he's
going to use logic circuitry on the system itself, so we have
to go back and review it for a day or two before he's ready to
go in again. I was wondering if you could teach power
supply, and then we could teach power supply on the hardware,
itself, in increments since they are going to require that particular
type of basic electronic knowledge?

Mr Anderson

I think that's a dilemma, CONARC must decide if they want functional
context right down the line on SOLAR equipment or do they want
common core. We can give you functional context common core. I
don't agree with the old concept that says you pile it all in the
beginning. You pick that piece out later that has to do with
retentivity, memory, etc. It really doesn't work and we know it
doesn't work. I think something different is occurring here.

Mr Wellford

Where do we get the logic circuitry? Can we pick up the COBET
packet for logic circuitry and put it in the hardware phase in
our school?

Mr Anderson

I'd like to have Walt McDowell from CONARC say something about
that since he's holding the post there.

Mr McDowell - CONARC

You are absolutely correct Mr Wellford.

Mr Anderson

That's what Aberdeen is doing. Aberdeen is taking the pieces they
want. Taking those chasis and employing them where they fit.

Mr Wellford

Well, apparently that only works for those subjects that you
would not put in the AIT?

Mr McDowell - CONARC

The AIT is designed for those courses that are still front-end
loaded with basic electronics. We don't like it but this is
the way some of our courses still are. We can only twist the
arm so far.

Q - CPT Stiff - Ft Knox

I have a question for CPT Vaughn. We've got a clerical battalion.
Last Friday we had 305 holdovers out of 680 students. Now, you
people can get orders for AG and Finance School, and DA can get
orders down for their people on the third or fourth week. What
is being done for the rest of these people that are holdovers
for one to 23 days?

A - CPT Vaughn

Your main problem is 71B10, right? We hoped the solution would
be made this morning. The holdover problem at Ft Knox, as well
as the other training centers, has been identified and all I
can say is a greater OJT program - applicatory training.

Q - CPT Stiff

I realize that, I saw it on your slide. Are you people pushing it on up the line somewhere?

A - CPT Vaughn

Yes we are. We are trying to make higher ups aware of the problem. I was hoping that it would come today, but we are going to have to probe this a little further and find out. We claim this is a problem and I think Mr Crick might be able to give us a little more on that.

Mr Crick

Assignment personnel of DA says we have no problem; therefore, they decided not to send someone to this conference. We discussed this with DA three years ago and I'm sure the AG School is still talking to them about it. They tell us, in essence, that as long as we are dealing with Public Law 51 there is nothing they can do, unless this man gets a CONUS based assignment. If we are dealing with courses over 16 weeks, and Public Law 51 has been satisfied, DA says that the Reg 600-200 describes how to handle graduates of self-paced courses. We tend to agree with them. We further tend to agree that the problem you have posed here lies in each local installation. DA has issued orders but they may be in someone's IN basket awaiting action. Now, back to the 71B graduate, the man that may have completed a 4 week course in one week then has 9 weeks towards his 16 weeks. About the only solution there is would be similar to what they did at Ft Knox, and that was to farm these people out to the hospital and other parts of the post as clerks. The results there - the hospital wanted more of them. The assignment structure, as such, we are going to discuss tomorrow. We have Harold Hunter here who has worked with the assignment personnel of the Pentagon for several months trying to find a solution to this problem. Basically, the way it works now, within the first five days of his training the TCC (the Training Control Card) is submitted to DA. DA says they get the assignment back in four weeks. This is all on tape and sometimes there is a backlog. Right now we do have a problem with Public Law 51. I might add, Dr Hunter did find out, and I don't guess this is classified, DA is attempting to go to Congress to get this law changed. They are trying to reduce it to 8 weeks.

INDIVIDUALIZED INSTRUCTION IN THE AIR FORCE

Donald F. Mead, Major, USAF

Good morning. It is a pleasure to be invited to attend your conference and to speak to you about applications of individualized instruction in Air Force training programs. The responsibility for conducting technical training in the Air Force has been assigned to the Air Training Command, of which I am a member.

The Air Training Command conducts one of the world's largest training systems. In the past fiscal year approximately 500,000 men and women were trained in our 3,800 technical schools. In addition approximately 25,000 personnel were trained in our flying training program. This figure includes approximately 6,000 foreign students.

The technical and flying training programs are conducted at bases and technical training centers throughout the United States. At the present time we support five technical training centers and 10 flying training bases. In addition, we have approximately 100 small training detachments conducting equipment-oriented training at operational sites throughout the world. Our basic task is to provide each individual with the highest quality training in the shortest time and thus get him on the job as quickly as possible. As we all know, training is expensive. Consequently, we are continually seeking ways to improve the quality of our training while reducing the training time and cost.

Historically it was these factors which stimulated our original research into programmed instruction and individualized technical training. In October 1961 the Air Force began an experimental application phase investigating the use of programmed instruction under operational conditions. As a result of these investigations programmed instruction became an accepted Air Force training technique in August 1963. By September 1970 the programmed learning effort had expanded to the extent that 878 programs were in use. These programs represented more than 7,200 instructional hours, of which about 80% were developed in-house.

Our experience with programmed instruction presented problems and information which resulted in evolving concepts. Initially our programmed texts were characterized by small step size, many copy frames, and excessive cuing. We found we were producing students who could answer questions, but often could not perform. We obviously were shaping the wrong behaviors and needed to build performance into the programs. We also found that although the students learned the material, they were bored. The cause was the size of the information increments presented, so we altered

our concept to include "optimum step size." Finally we found
class management problems when we inserted a short increment
of self-paced instruction in an otherwise group-paced course.
Some students completed six hours of instruction in three hours
or several days training in one or two days. Personnel pro-
cessing of the fast student often obliterated the savings gained.
Perhaps most importantly, as our experience broadened, it became
evident that we could apply the concept of programmed instruction
not only to programmed texts, but also to study guides, lectures,
procedural guides, performance projects, televised lessons, multi-
media presentations, and computer-assisted instruction.

All of this experience has been incorporated in Air Training
Command's systems approach to developing instruction. This
system is described in Air Force Manual 50-2, which was published
in December 1970. Basically the systems approach is a process
of defining training requirements in terms of actual job performance.
By defining training requirements in terms of what trainees are
required to do on the job we assure that our training is relevant
and includes job essential instruction. Training requirements
are transformed into behaviorally stated objectives which in-
fluence course content, test development, and instructional media.
This system closely parallels the steps taken by the Army in
developing programmed texts as outlined in CON Reg 350-54. It
also parallels the system described as being used by Army Infantry
School as presented by LTC Bryce Kramer to the Military Testing
Association in Washington, D. C. in mid-September.

This is the Instructional System Development (ISD) model which
shows the step-by-step process of the systems approach. The
conscientious application of the ISD concept has invariably
resulted in a more efficient training course, with increased
student achievement and reduced training time. There is no
magic in the systems approach, just a logical, analytical
process. This process is not static; each step interacts with
the other steps. The center of the model describes the inter-
action loop. The outer loop is the curriculum loop and describes
how we develop instruction. First, we analyze system requirements
by determining what tasks and duties are required on the job.
Second, we define which tasks require instruction and how many
trainees are required. Third, we develop our training objectives.
Fourth, the most appropriate instruction is developed. Here we
emphasize individualized instruction as much as possible. Last,
we evaluate the system to identify strengths and weaknesses.
The interaction inherent in the model produces a flexible, valid
instructional system.

ISD is not going to revolutionize training but will bring about positive change. The ultimate goal of the ISD program is to produce quality instruction that is cost-effective. Training costs are reduced in several ways: (1) by eliminating non-essential elements from a course thereby reducing the course length; (2) by individualized training which frees the student to progress at his own speed, reducing student support costs; and (3) by reduced student attrition. Self-pacing, multiple tracking, and modular scheduling are a few of the techniques employed. We estimate that an excess of one million student academic hours and 2.8 million dollars were saved by ISD in Fiscal Year 1970 through student acceleration, redefinition of essential training, and employment of appropriate training media.

I would like to discuss several Air Force programs modified by the ISD approach, not for their spectacular achievement but to illustrate their innovative approaches. At the present time ATC has completed 43 ISD projects of varying size and scope. In some, the entire instructional system is completely self-paced. An example is the Administrative Specialist Course at Keesler AFB, Mississippi. Here students who demonstrate the required typing ability are not channeled through the standard, routine training required of beginning typists. Instead, they employ their typing skills and progress on to learn correct correspondence format, and gain familiarity with required forms and filing systems. In all subjects the student proceeds as fast as his ability allows. The conventional course was 330 hours in length. The average student completes the present version in 264 hours, even though additional instruction has been included. Some have completed the course in as few as 60 hours, slightly less than 20% of the original time allotted.

We also have developed several self-paced packages which we send to supervisors in the field to update training or provide career development training for our personnel. This is a new program called Automated Apprentice Program. Under this program the trainee will bypass the technical school and report directly to his base of assignment. There he will receive training for his job using an audio-visual programmed instruction package.

Another course that has been completely self-paced is our Mainte-nance Analysis Technician Course. The development of this course involved several innovations. The first is the structuring of the course into 17 independent lessons which can be taken in any sequence. This obviates the necessity for maintaining multiples of the lesson units and permits the second innovation--random entry. The quotas are assigned by calendar quarter, and students

may enter on any day of the quarter. This provides a heretofore
unprecedented flexibility for the using command and a convenience
for the student. It has virtually eliminated the practice of
sending "quota-fillers" whose chief qualification is availability.
The third innovation is the "open laboratory" concept where the
student is provided with a key to the facility and permitted to
work as many overtime and weekend hours as he wishes. Each of the
17 lessons is introduced with a videotape, produced in-house by
course personnel.

Upon entry into the course, the student is briefed on the operation
of the playback unit and monitor in the viewing carrel.

After he has successfully completed the appropriate test to demon-
strate achievement of the objective, he selects the next lesson
from the cabinet. When he has completed all 17 lessons, he is
graduated and returned to his organization.

The performance part of the course is achieved through the use of
study guides and workbooks which provide analytical problems to
be solved on the electronic calculators. When the course was
taught conventionally, with class-size groupings in a lock step
environment, the course length was seven weeks. In the present
self-paced configuration, one student finished in 13 days, and
the average time for all self-paced students is 21 days.

We have developed some multi-track courses such as our Maintenance
Electronics Course. This course teaches electronic fundamentals
which are applied in equipment-oriented follow-on training.
Task analysis revealed that the electronic equipment the students
would be maintaining after graduation varied, and some students
needed greater training than others. We reduced the training time
for one track by an average of 90 hours by eliminating training
this group of students did not need. We have gained an additional
saving of 150 hours for the average students by permitting them
to proceed through the course at their own pace.

Many of our courses employ multimedia to attain the identified
training objectives. For instance, in our driving safety program,
which has obtained nation-wide recognition, we employ the Raytheon
multimedia equipment incorporating tapes, slides, motion pictures,
and student response. I might add that by requiring all of our
personnel below the age of 26 to take this driver's education
course, we have reduced accidents by more than 25%.

The application of individualized instruction is not free from
administrative problems. For example, how does one arrange
independent learning paths for each student? One answer is
modular scheduling, the arrangement of segregating similar tasks
into separate blocks of instruction. Since each block is inde-
pendent the student may undertake any one without requiring the
others as prerequisites. At Keesler AFB modular scheduling is
used in the Communications Electronics Staff Officer Course.

Each student reviews the course objectives with an instructor in light of his past experience and educational background. During this meeting a path of instruction is determined.

Where practical the student is given a choice of media. One interesting side note is that since he helped develop the curriculum, the student is motivated and more prone to support it.

This approach requires close coordination and support of administrative personnel. We must insist that students be able to enter whatever instructional block required, without undue delay. Otherwise processing delays might offset any gain expected by individualized instruction.

When students meet on subjects of special interest, the lecture approach may be employed, but in programmed format. An example is the Medical Service Specialist Course at Sheppard AFB, Texas. During a lecture, the student uses workbook exercises to reinforce the learning activity. These exercises contain technical data and questions pertaining to the lecture material. The exercises are accomplished during or immediately after each unit of instruction. The instructor then supplies immediate confirmation of results. In this way both the student and the instructor know if the learning objectives are successfully obtained.

Our Electronic Principles Course at Keesler AFB uses a pretest and multiple tract format. Those students who are found by the pretest to be average are trained using discussion, demonstration, TV lessons, and laboratories.

For students who score in the higher ranges on the pretest there is a self-paced program. These students study, do lab work, and schedule their own TV presentations as they desire. For students found deficient in certain areas such as math there are specially prepared tracks. Students transfer from one track to another as their progress, or lack of progress, dictates.

The Aircraft Electrical Repairman Course is a completely self-paced instructional system.

In addition to the programmed texts and workbooks, this course uses cassette type sound color 8mm films, with headsets to prevent distracting other students.

To compensate for poor student reading ability, we use audio tapes supported by filmstrips to depict the task to be performed, plus the actual bench item or trainer. The students can thus hear, see, and feel simultaneously. He records his responses to audio questions on an evaluation worksheet. Since the entire course is self-paced, the student can repeat each lesson until he has mastered it.

Complicated electrical circuitry can be self-taught. This student
is using a programmed text which directs him through the check-out
of a printed circuit board. The oscilloscope tells him whether
or not he is getting the proper wave pattern for that particular
circuit. Again, each lesson is measured with a criterion test and
the achievement of the objective is certified by a qualified in-
structor before the student is allowed to progress to the next
lesson. Since implemented, the Aircraft Electrical Repairman
instructional system has graduated 825 students. Average time
for completion of the 60 day course is 67 days. One student
completed the training in 30 days, another required 111 days.

As you are aware, civilian industry and civilian educational
institutions are making dramatic strides in the development of
new technologies, impacting on technical training. We are hard
pressed to stay current with developments and to evaluate these
technologies for application in Air Force programs. I would like
to touch briefly on some of the Air Force programs currently being
evaluated.

Air Training Command has established learning centers at four
pilot training bases. The media equipment in each center is
varied and is being evaluated to determine the optimal mixture
for this environment. The basic concept is the same in each
center: we are developing automated or mediated instruction
to supplement or replace live instruction.

Our most complex learning center in Air Training Command is
located at Williams AFB, Arizona. This facility features dial
access equipment whereby the student may telephone for selected
taped video instructional material which he receives over an
individual monitor.

The center also features T-37 and .....

T-38 cockpit carrels. These carrels provide facilities to learn
the instruments and procedures associated with their aircraft
and training program.

A rather novel application of individualized training incorporated
in our undergraduate pilot training program is the inflight audio-
video recording system. Here a student's flight mission is
filmed and recorded using equipment mounted in the cockpit. One
camera scans the horizon and one is focused on the aircraft
instruments. Communications between the instructor and student
are recorded.

Upon landing the student takes the film to a monitor to immediately
relive the experience but without the inflight pressure of handling
the aircraft. The results of this research appear promising.

IV-63

Potentially one of our most rewarding research efforts involves the
use of computers in training. An example is the Computer Directed
Training System. Headquarters USAF directed the development of
this system to train Burroughs 3500 computer operators as an alter
native to resident training.

This computer-operator CAI course of instruction operates through
student/computer interaction on a remote terminal.

Course dialogue is recorded on the print-out and .....

student progress is monitored by end-of-day print-out. This program
may be sent to various bases where the trainee may learn on his
work equipment and in his work environment. This program permits
the computer to train its operator to run the computer with minimum
supervision of the immediate supervisor. The approach offers
considerable savings in TDY and course support costs.

A second experimental computer project is the Time-Shared Interactive
Computer-Controlled Information Television Automated Instruction
System or TICCIT. This program being developed by MITRE Corporation
provides computer generated or controlled information that can be
selectively received and displayed over individual TV monitors.

A prototype system has been established in Reston, Virginia, using
closed circuit television cable. The touch telephone is used to
gain access to the computer; however, in our program each student
terminal will have a keyboard. Each TV monitor can receive separate
information provided by the computer, which features random access
with less than .5 second reaction time. A signal "refresher"
device which incorporates a video cassette recorder allows the TV
screen to display the information at the standard television rate
of 60 fields per second. Instructional information is stored
on disc packs. TICCIT is being evaluated to support the Electronic
Principles Course at Keesler AFB, Mississippi.

The Lincoln Laboratory Project or Lincoln Training System (LTS)
is a joint experimental effort of the Massachusetts Institute
of Technology and the Keesler Technical Training Center.

The LTS-3 trainer proposed for service test at Keesler employs
a stand-alone terminal featuring both viewing screen and audio
speaker.

It also uses a keyboard for each student terminal. The keyboard
can be programmed and, as there is control logic associated with
each frame of each lesson, the course author has complete free-
dom in the assignment of functions to keys and in interpretation
of student responses.

Each student's position is connected to a central computer which monitors progress and controls branching as provided by the instructional programmer. This system replaces a large computer memory with a rapid random access microfiche file and these fiche contain both coordinated audio and video. The system also employs a special authoring console to facilitate development of instructional programs and the synchronization of audio and visual presentations. The LTS system with four student positions will be installed in mid-November of this year for evaluation.

Our highest priority development, the Advanced Instructional System, is underway at Lowry AFB, Colorado. The objective of this advanced system is to take three full-length courses in the Lowry Technical School, develop them for individualized, audio-visual instruction, and provide computer management systems to control student progress individually through each course. Contractual efforts will provide course design, media selection, carrel design, and system specifications.

So there you have it. The Air Training Command is very much involved in individualizing instruction. In view of what we have learned, we can ill-afford to do otherwise. The pay-offs are substantial, for while we save a lot of taxpayers' money, we have also found that by individualizing the students' training, we improve efficiency. Students are motivated, instruction is more behavioral, equipment receives increased use, and the student is no longer simply a number.

INDIVIDUALIZED LEARNING IN THE NAVY

Mr. Bernard C. Monnes, Bureau of Naval Personnel,
Washington, D.C.

Individualized instruction is not new; it can be traced back in
one form or another to the early Greek days of Aristotle, Plato,
and their peers.

Recent developments in programmed instruction, audio-visuals,
and computer applications have provided the media to support
self-paced or individualized learning. The equally recent
development of concern for what a student learns has given
sufficient visibility to the learner that the instructional
field became sufficiently fertile to permit the growth
of individualized learning. Some of us feel that this change
took place when we replaced "teaching objectives" with "learning
objectives" in referring to instructional goals.

The Navy has a small variety of individualized learning systems
in operation. Examples of some of the training areas include:
typing, Morse code, computer operation, use of test equipment,
electronic principles, and electronic equipment maintenance.
Others are under development.

Each of the above vary in types of media and techniques employed.
The system that will be described is that which is being used in
the Basic Electricity and Electronics Course. This course is
established in two localities, San Diego, California, and Great
Lakes, Illinois.

The Basic Electricity and Electronics course provides training
in DC and AC electrical principles and basic test equipment
skills for ten electronic-oriented ratings in the Navy. Upon
graduation, students report to their own schools for additional
training in more advanced electronic subject matter. Both courses
were fully individualized on 1 July of this year.

This course satisfies the characteristics found in most of the
definitions that have been published for individualized learning.
These include:

a. Completely self-paced. Learners progress and are encouraged
to move at their best learning pace. The principle involved is that
slower learners require more time than faster learners. Students
enter the course at any time of the week providing a carrell, or
learning space is available. They complete the course when they
have satisfactorily "passed" the last examination, which also may
occur at any time of the week.

b. <u>Diagnostic testing</u>. Examinations are taken at the completion of each module (topic). These are diagnostic in nature in that no grades are assigned and that the student must demonstrate by his application of knowledge or skill that he is capable of achieving all learning objectives that have been designated as critical. Failure of any critical test item, written or performance, is cause for remediation. Critical objectives are those which signify mastery of the module subject matter. All other learning objectives are designated as non-critical or supporting. Eighty percent of the test items for the non-critical objectives must be answered or demonstrated correctly. For each learning objective developed for the course, there is a corresponding test item or items.

c. <u>Multi-media learning materials</u>. A variety of learning media are available. The student may select any of the media to prepare himself for learning objective achievement. Choice of media is based on the principle that no single form is best for all students. Available media fall into two broad categories: (1) printed or test material, and (2) audio-visuals. Some students find it necessary to try two or more forms of media within a lesson before they are satisfied they have achieved the applicable learning objectives.

The individualized learning system in the Basic Electricity and Electronics Course consists of 15 modules. A module may be considered as a distant cousin to a topic in a conventional course. Each module consists of two or more lessons. Average completion time for a module varies from 2.5 to 9 hours of study and lab work.

Each lesson within a module is followed by a test. The student evaluates the results of the tests. If he is satisfied that he has achieved the designated learning objectives, he moves on to the next lesson. If he believes that the results were poor or even suspect, he remediates himself through appropriate portions of the same media or possibly another form of media.

If the student has previous knowledge or instruction in the module subject matter, he may complete the module by taking only the lesson tests to confirm his convictions. This occurs quite frequently since many who enter the Navy have had previous electronics education at the high school, technical institute, or college levels.

Each student must take and satisfactorily pass an end-of-module test. The test is evaluated by a learning supervisor. As stated previously, if all critical test items and 80% of the non-critical test items are answered/demonstrated correctly, the student is allowed to progress to the next module. If not, the learning supervisor and the student discuss the module test results to determine the student's learning problem. The consultation provides the student with a prescription of what he should study to overcome his learning problem or lack of comprehension.

The types of printed learning media included in each lesson of each module of the Basic Electricity and Electronics Individualized Learning System are:

a. Summary: Provides a brief capsulation of the subject matter. The summary is intended to satisfy the needs of students having previous knowledge but require a short review to refresh their memories.

b. Narrative. Provides a detailed expose of the lesson subject matter similar to a chapter in a textbook. However, every few paragraphs are interrupted by a question or questions to assure the student that adequate comprehension has been achieved. The narrative is designed for those students who have no previous knowledge of the subject matter.

c. Programmed instruction. Provides the same information as the narrative but in a linear PI format. PI is designed for the student who feels he needs the continuing assurance of cue-response as he studies.

The printed matter described above are bound together in volumes by modules. The student may select one or more of the printed media to complete each of the lessons within a module. The final page or two for each lesson contains the lesson test.

Many students from foreign countries are enrolled in the Basic Electricity and Electronics Course. Experimentation proved that such students were having difficulty with the American language employed in these printed media. Audio tapes were prepared to follow the words of the narrative media. This provided a highly satisfactory solution to the foreign student language problem and also increased their capability to read the test materials used in the follow-on schools.

We have also discovered that American students with a reading difficulty have partially overcome this handicap by using the same audio tapes.

Audio-visual media are also available for nearly all of the lessons in each of the modules. Sound-slides (35 mm) have been prepared for all portions of subject matter, both knowledge and skills, that lend themselves to this technique. Reading the color-code of resistors and interpreting the value recorded by the needle position of a multi-meter are examples.

Where motion is required to demonstrate a principle or skill, edited training films are available. These were obtained by extracting selected portions of films previously prepared for Navy, Army, or Air Force training requirements.

Within appropriate lessons, directions are provided in the use and application of basic test equipment: meters, signal generators, and oscilloscope.

Probably the most important medium in the system is the consultation that takes place between the learning supervisor and the student who has failed to achieve the required learning objectives. The learning supervisor maintains a history of each student's failure to achieve both critical and non-critical learning objectives, selection of media, time to complete a module, and previous re-mediation. Based on the student's history and a handbook that provides remediation guidance in terms of non-achieved learning objectives, the learning supervisor uses a question-answer approach to help the below par student identify his learning problem and prescribe the remediation required.

The primary reason for individualizing this course was to improve learning. This has been accomplished through self-pacing and the availability of a variety of media, both of which compensate for variations in student learning capabilities.

Individualization has other advantages.

It has reduced attrition. Before individualization, attrition for academic reasons in the conventional Basic Electricity and Electronics Course was 9%. Now it is less than 2%.

Length of training time has been reduced. Thirty-three days were required to complete the conventional course; average completion time for the individualized system is 23 days. A reduction of 30%.

Student input into the course is 12,000 per year. The average number of students on board (AOB) used to be 1440; now it is 960. The 480 difference permits an annual savings of $900,000 in direct training costs and a reduction of 480 student man-years (at the rate of $3800 salary per man) charged against training.

Although difficult to quantify, individualization has also shown a marked improvement in student motivation, attitude, and study habits. Each of these contributes to better learning.

In the conventional course, training devices and equipment were procured in sufficient quantities to support two students per lab station. Since the students are traveling at different rates, the ratio of students per lab equipment in an individualized setting is approximately six to one. Where 212 sets of test equipment were formerly required, for example, only 71 are required now.

IV-69

There are items also on the debit side of the ledger. These include increased developmental and implementation costs, increased instructor capabilities, and new administrative problems.

Since a variety of media are employed, developmental and implementation costs are greater for an individualized learning system than for a conventional course. A comparative ratio has not been established and would probably be meaningless because of the variety of course contents and purposes and the many ways a course can be individualized.

If a course similar to Basic Electricity and Electronics were to be individualized and if the same types of learning media were to be employed, some figures can be quoted for planning purposes:

   a. Developmental costs - Two man-years per conventional course week.

A conventional course that is six weeks long will require 12 man-years of writing, scripting, filming, taping, pilot testing effort to produce the masters for the learning media. A 12-week conventional course requires 24 man-years. This formula is based on employment of in-house military and civilian personnel. If a task analysis is to be conducted prior to the development phase, and this is recommended, appropriate additional time must be provided.

   b. Pilot test materials - $2,000 per conventional course week.

The money pays for supplies, paper, photographic and art materials, and sufficient copies of software and audio-visual devices to test and validate the materials in a 30-student learning environment. Expensive lab equipment, training devices, or special items must be estimated separately. Pilot testing is highly cost-effective. It is much cheaper to make revisions before rather than after printing large quantities of the masters.

   c. Implementation - $200 times conventional course AOB.

AOB is the abbreviation for average number of students on board during the year. The dollar figure is adjusted to support the reduced AOB expected upon individualization. The amount will provide for a two-year supply of printed materials and sufficient quantities of audio-visual software and hardware to support the student load. Expensive laboratory items will be extra.

Another problem created by individualization is the need for a new kind of instructor. He must become a subject-matter expert in the entire course (or the segment conducted in his learning environment) since his students are in various stages of the course. He must be able to answer or find the answer to all questions that may be asked by any of his students. He also sheds his former role as a teacher and adopts that of a learning counsellor. He must put away his chalkboard habits and learn a

questioning/counselling technique to help students identify their
learning problem(s) when module tests show that they are in trouble.
Military instructors can be trained to do this. Their most difficult
job is the breaking of the lecturing habit developed in the conven-
tional classroom.

Individualization brings new administrative problems that must be
solved. Students no longer enroll or graduate on specified days
of the week. They enter when they arrive on station and graduate
when they have satisfactorily completed the last examination. This
aggravates the Navy system developed for the orderly movement of
personnel. Paperwork for students must now be processed in terms
of individuals rather than by classes. Completion time of each
student must be accurately predicted to allow sufficient lead time
for preparation of orders, pay-checks, and other items which are
important to the student. Locating of students must now be done
by carrell numbers rather than room numbers. In fact, any event
in an administrative process designed to support conventional group-
paced training will become troublesome when applied unchanged to an
individualized system. The difficult part is to convince the
administrators to change their procedures.

Because of the benefits to be derived, the Navy is making plans to
individualize appropriate courses as rapidly as funds and manpower
become available. Of several recent starts, the largest develop-
mental project is SPLICE (System for Planned Learning through
Individualized Core Elements). Fundamentally an expansion of the
Basic Electricity and Electronics Course, SPLICE will produce
individualized learning modules for all of the basic knowledge
and skill topics required by ten electronic-oriented ratings prior
to entry into their equipment maintenance courses. The nucleus
developmental crew has started a task analysis of these ratings.
The task statements will be used to prescribe the behavioral
learning objectives for which the modules will be developed.

SPLICE and other systems will be developed by in-house military
personnel. To support these efforts, courses are under preparation
to train Navy men to (1) perform a job/task analysis, (2) write
behavioral type learning objectives, (3) develop learning media,
and (4) supervise individualized learning environments.

INDIVIDUAL INSTRUCTION

Dr. Harold G. Hunter, Senior Scientist, HumRRO Division No. 1

Gentlemen, for years the problem of training a mixed mental ability
student population has caused great concern on the part of educators,
military and civilian. Advancements in the state of the art have
provided only a partial solution to the problem. Therefore, if
men of all aptitude levels are to be taught together, then a means
must be developed to prevent the strengths or weakness of one
individual from jeopardizing the progress of another. In other
words, a means of dispensing individualized instructional programs
within the classroom must be developed.

Before proceeding, let's clarify the term "Individualized Instruction."
This technique represents perhaps the most progressive educational
step which has been undertaken since sequencial learning.
Individualized instruction encourages optimum development of an
individual by capitalizing on his interest, aptitudes and abilities.
Individualized Instruction is often confused with self-pacing. The
decision to use a self-paced training program is probably based on
the premise that a given subject can be taught most effectively
utilizing a particular medium; therefore, one medium --- be it
programed text, audio-visual, or what have you --- is all that
is available to the student. A subject presented by programed
text may be advantageous for the higher level student, the fast
reader with a high rate of comprehension; but what about the poor
reader or the student with low reading comprehension? Since self-
paced instruction involves a single medium for a given subject,
it may disregard the strengths --- and weaknesses --- of the indivi-
dual student.

Individualized instruction will supplement the student's weaknesses
and capitalize on his strengths, making it possible for each student
to progress through the course at a rate which is commensurate with
his ability. This is accomplished in Individualized Instruction
through the employment of multi-media with media selection based on
(1) tasks to be taught and (2) suitability of selected media for the
individual being trained.

Essential in the development of an individualized program is the
selection of a systems engineered course since it provides for
a functional context approach, placing the emphasis on student
performance rather than on subject matter. The problem of
assimilating is therefore minimized since the course is developed
in a functional, job-related sequence that provides the student
with necessary facts and procedures, when he needs them, as
opposed to teaching a particular subject in its entirety and
requiring the student to determine how and when to apply the
knowledge gained.

The selection of media and its suitability for the individual student being taught is the second requirement in individualization. I will only cover six of the more important media utilized in the Quartermaster School Project. The selected media include (1) programed text (branching), (2) adjunctive programing, (3) cartooning, (4) audio-visual, (5) audio, and (6) gaming. It should be mentioned here that while I will cover each of these media as separate entities, the system when completed will be made up of a multi-faceted, multi-sensory approach which will enable the student to direct his own activity to attain the desited objective. The learning experiences are integrated with provisions for individual student differences, with each experience planned to present efficiently some important aspect of the subject.

The first medium, programed text, is one familiar to most of you. For the good reader this medium provides a highly efficient, accepted method of instruction. Through the application of the branching techniques this medium can accommodate multiple learning rates.

While offering much as a programing device, the programed text has not become a MECCA to education. There are at least three major types of students for whom programed text sets up a barrier to learning. The poor reader or nonreader obviously cannot learn through this medium. The good reader who dislikes reading, or at least dislikes reading a programed text, will often develop a mental block to learning if forced to use this medium. The third type, the student who does not comprehend and/or remembers little of what he reads, finds little help in the programed text medium.

Akin to the programed text in its dependency upon a satisfactory reading speed and comprehension is adjunctive programing. Its value lies primarily in the fact that it allows maximum use of materials already printed or developed, while the text, per se, serves solely as a "road map" to the various sources of pertinent information. Every year tens of thousands of new books are published in the United States. School, public, and private libraries are bursting at the seams with information free for the asking. Much of this information is pertinent to the military and with proper direction could provide an education worthy of the most capable person. Technology is progressing more and more rapidly each year and if we are to continue to progress in training we must begin today to utilize more extensively the materials from sources outside the classroom environment.

Audio-visual serves much the same purpose for the non or poor reader as the programed text does for the good reader, with the audio portion providing the programing device and the visual being used to reinforce the learner's knowledge and understanding.

It has often been said that a picture is worth a thousand words; this may not always be true but a well planned visual will often provide for the slow learner the thread which will tie his new learning experience to those of his past. Let me use a rather simple example to illustrate this point. I am going to use words alone, spoken in this case, to teach a concept. The concept I want to teach concerns a "ball." Since all of you have had some experience with something called a ball you already have developed some idea about what I am going to teach. For some, your idea of a ball may be the one you had last night at happy hour. Since there are many concepts of a ball, more information must be given. The ball which I am referring to is about 8" in diameter and is used in a game called basketball. Assuming that everyone here has played or at least watched a basketball game, I assume also that you know exactly what I mean by a "ball." Words rely on previous experience to give them meaning and up to this point I have assumed that we have all had the same experiences. In this case, this is not a valid assumption. I'm from _____ and as you may know, in _____ we have an ABA team and so the basketball I am thinking of is red, white, and blue. For the slow learner such inconsistencies in experiences often occur. Had I shown you a picture of the ball in the beginning we all could have started with a similar experience, with all other information building on that common experience.

There are, of course, many kinds of visual materials. In fact, any stimulus which we observe with our eyes might be classified as a type of visual material. One type of visual has had great influence on the attitudes and thoughts of people for years, but only recently has it found its place in education. This type of visual is cartooning. Cartooning as an independent medium may well become one of the most significant media available to education. Political campaigns have been fought and perhaps even won or lost through the use of simple cartoon figures, and how many of us hurry home each night to see the latest antics of Snoopy and the Red Barron. When applied to individualized instruction a well planned cartoon adds both interest and a personal touch to the sometimes cold world of machines and programed materials.

One major task required of students in the currently designed course is to be able to trace the flow of a large number of documents through the Army supply system. Many of these documents have a similar appearance and purpose; therefore, the student often becomes confused with the type of document with which he is working. To overcome this problem in the individualized course, a family of forms was developed using cartoon characters to represent the different forms, each member of the cartoon family having its own special characteristics and job in the supply family. As the course progresses, the student relies less and less on the cartoon character, with only its outstanding characteristic being necessary to stimulate the desired response with the actual form.

This is just one of many problems which the use of cartooning has helped solve in the individualized instruction program.

While visuals play an important role in the instruction of many tasks, there are some tasks where the use of visuals would not serve to improve instruction.

In these cases a straight audio presentation is sufficient. The written or spoken word remains the most effective and efficient means of communication known to man. When tasks are found which can be taught by audio alone, the savings in time and money should be encouragement enough to adopt the medium.

The final medium which I will discuss is gaming. This technique is particularly relevant where students are being taught task performance which involve dialogue and interplay between the students in on-the-job situations and other persons. Games allow us to make an "experiment with reality" to test and evaluate personnel or management decisions without incurring the risk of an actual on-the-job test. Participants in the game cope with real life problems, but by stripping away non-essentials a game can simulate a year or more experiences in but a few days of time. It is particularly appropriate for increasing motivation to learn. From the time we were very young the need to "win", to be successful at something, is exhibited in our lives. As adults, we spend hours of our leisure time playing bridge or other games of chance, not because of any monetary gain, but because it gives us the opportunity at times to be a winner --- or a loser. Life is a game of successes and failures. For many students in a conventional learning environment it's failure consistently. In individualized instruction the game of life provides the motivating factor so necessary to success in learning.

At this time I would like to direct your attention to the learning carrel at the rear of the room. This is the learning environment currently being tested and utilized at the Quartermaster School. In the learning center the carrel will take the place of the man's working environment on the job. It will contain all the stimulus, i.e., forms, audio-visual material, etc., which he will need to perform an actual on-the-job operation. The basic equipment for each booth is a tape playback unit, a slide projector, and the other materials appropriate to the lesson being taught. Each booth in the learning center is equipped identically so the student can study independently of the progress of the other students. A carrel equipped as you see it here costs less than $300. While it is true that more expensive pieces of equipment are available for instruction, it is felt that the added expense does not result in a better program. It is the information programed into

the carrel, and not the equipment, which will determine the success
or failure of the project. For this reason each of you should be
afforded the opportunity to "study" in one of these carrels and
become involved in the learning experience. Since this is not
possible, we have extracted a short demonstration sequence,
taken from an actual block of instruction, for you to view on the
overhead screen at this time. I ask you to keep in mind that
what you are seeing is only the tape-slide portion of the program.
Within the carrel the student would be involved with many other
stimuli simultaneously: thus the portion you will be seeing is but
a small part of his integrated learning experience. You may
examine and operate the equipment in the carrel following this
presentation if you so desire.

(6 MIN. DEMONSTRATION SEQUENCE)

QUESTIONS AND ANSWERS

SESSION #3A - Lessons Learned from Application of Individualized
            Instruction

Q - Mr Dare - USA Ordnance School, Aberdeen Proving Ground

Is there any pattern for accelleration of students?

A - Dr Hunter

We had to make simplifying assumptions, for example, with all kinds
of exceptions. Generally speaking, you look at all the data you
can get your hands on. When you individualize a course, whether its
by Programed Instruction or not, you can expect to reduce total course
length by a mean of 1/4. The distribution of completion time will be
approximately normal with a standard deviation of about 1/5 the
original course length. With these kinds of simplifying assumptions
we constructed, artificially, 65 distributions of various shapes
and sizes put them in a computer, and then randomly selected from
these 65 distributions. There was an attrition rate built in
that reflected the current attrition rate of about 3 1/2%. Then
we took about 5 years of actual input data from DA, put it in the
computer and observed the output. (How many people are going to
graduate on what day, with this data, how much time is going to be
wasted if you haven't anything better to do with these men until
the next course convenes.)

Q - Mr Dare - USA Ordnance School, Aberdeen Proving Ground

This is not what I was getting at exactly. Self-pacing reports
reflected the type of data on a class in session in Lockstep, timing
a student, when he finishes. We found that in the particular course
that a man who attended class all the time, except for unexplanable
reasons, didn't lockstep. When activated we found that the
pattern, by student, perhaps by various scores or something of
that sort, would help.

A - Dr Hunter

That's a good question. I can't answer it very well. The man that
actually did the study is giving a presentation someplace else.
I can get the information for you.

Q - CPT Odom - Ft McClellan

You talked about the large size buildings you have for the carrels.
What have you discovered about the student in relation to the
learning supervisor?

A - Mr Monnes

In answer to your question, one of the reasons we went to the
different size rooms was to determine the learning supervisor,
student ratio. We still don't have a good handle on it yet
but what we are experiencing now is particularly the larger size
classrooms, 112 carrels, a ratio of one learning supervisor
to 20 students. As the learning supervisor develops better
skills in the techniques to be used, we believe that the ratio
can be a little higher. This is true in the San Diego school.
Great Lakes school had an old building with walls in it that
held up the ceiling. It was limited to the number of carrels
that could be put in one room. Once again, by cutting wide
doorways between the rooms and allowing access to four rooms to
three learning supervisors we came up with a ratio of one super-
visor to 22 students. In addition to the learning supervisor,
we also require a man we call the Resource Center Supervisor.
This is a space in the learning environment that the student goes
to when drawing his learning materials. (Textbooks, slides, audio
and pictures).

Q - CPT Odom - Ft McClellan

I noticed one time when I visited a Navy Electronics Ordnance
Center that they were set up almost identical to your slides
for repairing equipment. Was this deliberate or just something
that happened? This was in Vietnam.

A - Mr Monnes

Was that for the American sailors or Vietnam sailors?

A - CPT Odom

American sailors.

A - Mr Monnes

Well, we built an Electronics Training Course for the Vietnam people.
I didn't know the American students were going to school there.
It wasn't built on the individualized training system concept, but
used much of the same material which was used in the first 6 weeks
of the course that you saw on the slides. In DaNang and in Saigon
we have a crude form, or rather the Navy has a crude form, of
an individualized training system to teach Vietnamese. They use
much the same material that we use over here.

Q - Mr Lantz Fort Monmouth

What's the carrot on the stick that makes the individual want to go
faster in the course? Our Army people, from my observation, is that
they don't care about getting there any faster. When they get to
the field they are in a combat situation. How do you motivate them?

A - COL Bean - C-E Maint Dept, USASESS

We'll discuss that in detail at the next session.

Q - Mr Lantz, Ft Monmouth

MAJ Meade, have you made any comparisons between the courses with
the software and hardware involved versus the savings? Whether
there was an improved savings or whether there was, in fact, an
indebtedness involved?

A - MAJ Meade

Well, initially I think you will have an indebtedness but you
usually amortize it rather fast. As mentioned earlier, you are
reducing your time so it amortizes itself rather quickly. Almost
without exception, this has been the case.

Q - Mr Lantz - Ft Monmouth

Somebody made the statement that there was a decrease in the equip-
ment cost. Will you explain this to me? I don't quite understand
it. The general concensus is if you are going to individualize
instruction you've got to have a piece of equipment for each student.

A - Mr Monnes

In this particular course that I used as a vehicle to demonstrate
one of our systems, in the conventional course we had a lab station,
a hands on work station set up for two students working together
on a job sheet. The students are moved from a lecture type class-
room into a lab; or in one of our courses we had the lecture room
and the lab inside of one space. They were scheduled and moved in
lockstep method from a classroom instruction to a lab station and
back again. In some parts of our course we would use the same
type of test equipment throughout the six weeks of the course.
Wherever that class was, we needed that piece of test equipment at
the lab station. Look at a conventional course; the way we were

teaching it as one lab station with equipment for every two students
that were on board. When you go to the individualized system
where the students travel at a different rate, the ratio becomes
six students to one set of lab station equipment. That's where
the reduced quantity of training aids and training equipment occurs.

Q - Mr Lantz - Ft Monmouth

Where did I interpret the statement that the man improves his
reading skills by going to an audio tape?

A - Mr Monnes

I don't think that, or I hope that I didn't make it that positive.
Either a foreign student, or an American student when they first
start, use the audio tape version of the narrative text. Ears
and eyes that are following verbatum tended to speed up the reading
rate and with 4, 5, or 6 weeks of that kind of treatment he developed
better confidence and competence in his ability to read.

Q - Mr Totti - Ft Benning

In the next hour when USASESS discusses management and control of
students in self-paced courses will that include more about matching
students with media?

A - Mr Crick

No

Q - Mr Totti - Ft Benning

How does the Air Force match the student with the media?

A - MAJ Meade

Well, again it depends on the cour and the prescreening. In some
courses the student will have a choice; in other courses he will not
have that opportunity.

Q - Mr Totti - Ft Benning

Are tests given? What kind of tests are they?

A - MAJ Meade

Typically it would cover the learning objectives that the student
is to achieve during the course. Find out where he is on a pre-test,
and then let him go from there. Also incorporating pre-experience
such as job wise or education wise. For the more apt student,
chances are we would give him more choices than the average student.

Q - MAJ Gutzman - Ft Polk

Is there a general catalog of listings of these programmed texts
for the three services?

A - MAJ Meade

I'll answer for the Air Force; there is, and I think there is
DOD wide.

A - Mr Crick

CONARC has a Programmed Instruction Catalog, I think it's
CON Pam 350-54.

A - Dr Hunter - HumRRO

I've done a survey myself of the services trying to find out and
I've got a listing.

A - Mr Crick

At one time DOD was attempting to establish a clearing house for
all Programmed Instruction on all services and identify these in
one publication. I'm not sure what has happened to this proposal.

A - Dr Smith

I think that floundered on service objective.

Q - MAJ Gutzman - Ft Polk

There are three separate listings. In other words there is no
consolidated listing?

A - Mr Crick

Not to our knowledge.

Q - Mr Ling - University of Georgia

I noticed in your handout you sighted a number of sources of
major instructional objectives. Just what exactly are the
components of your instructional objectives?

A - Mr Monnes

Behavior, condition, and standards. That needs a little
amplification. In writing learning objectives or individualized
instruction, we find that you must write very precisely. The
greatest time involved in the development work is instructing in
the learning objectives. They are written in such precise language

IV-81

that with just a little editing they become the performance test
items and the written achievement test items. This is the way
we write our examinations, both for the written test and for the
module test. We have a program on how to write these various
learning objectives; it involves a series of courses. One is
a course having to do with Programed Instruction material. A
lot of experience is gained in this particular course. About
two weeks of the course are devoted to instruction on how to
write a learning objective for Programed Instruction material.

Q - Mr Ling - University of Georgia

In your presentation of the objectives to the student learner,
this is included with the particular lesson he is studying?
How does the learner choose the particular objective he is to
learn?

A - Mr Monnes

The student must assume he needs all learning objectives. The
written material in the six or seven types of media from which
he can select leads to the learning objective of those lessons.
In the overview, the student is advised that if he thinks he
knows the information as a result of reading the overview he
goes directly to the lesson test. This serves the purpose of
finding the learning objective that he is to achieve and mea-
sures whether or not he is achieving it. Let me reiterate one
more time, we write the learning objective in such precise de-
tail that with just a little editing it becomes the performance
test.

Q - Mr Dare - USA Ordnance School

In talking about a need for a new type of instruction to go end-to-
end in the course, is this your constant pattern or do you have
courses in which the learning supervisor is restricted to modules
and sub-modules and on what basis?

A - Mr Monnes

In the sample I gave, a group of learning supervisors are assigned
to the learning environment of a various number of carrels. Learning
supervisors must be a subject matter expert of the material. He
is usually an ex-instructor in that type of subject matter. He
is sent through the individual learning system, takes all the tests
just like a student, and is remediated if necessary. He must
complete the course satisfactorily. Then he is assigned the job
of an apprentice, learning supervisor and works with a supervisor
that is qualified.

First, he completes the learning supervisors course. Then he be-
comes an apprentice, learning supervisor and usually within three
weeks he becomes qualified as a learning supervisor. When we
expand the concept of the basic E&E Course we feel sure that we
will have to divide the total package into segments, having a
learning supervisor qualified only in a portion of it. In other
words, a student may come into one learning environment of that
segment with that learning supervisor and, once he completes it,
go on to another group of subject matter and be exposed to another.

QUESTIONS AND ANSWERS

SESSION #3B - Lessons Learned from Application of Individualized Instruction

Q - LTC Qualls - Ft Lewis

I want to ask a question, but make a comment essentially in asking, that is apropos to the three services. We are generating a monster that is going to bite us when we keep talking about all the savings. The military manpower is not generated by school quotas. It is generated by the level established by Congress. The TDY funds are somewhat insignificant, DOD wise, on the basis of the changing average hours that it takes to complete a course. In some cases, it costs even more money because the man gets promoted when he finishes as one of the exceptional students. Transportation is the same; and the installation does not change it's O&MA, facilities, and what have you just because the class ends a week early. I don't think we can justify "savings" except in isolated individual type facilities. I'm not objecting to the Commandant trying to look good because he's saving money, but the military is not saving money. I would like to know how we keep saying that we are having all this savings, when we go to individualized training.

Mr Crick

Well, I may be wrong, it may have changed, but we know for a fact that it cost us X number of dollars for each student for each day he's in the training base. If we can remove the man from the training base, we are saving training base money. Now I know this is an accounting problem and I don't know what happens to the money, but one of our goals is to turn out a better student in less time for less cost.

LTC Qualls

Somebody else has to pay for it. He doesn't get separated from the service, this is what I'm saying.

Mr Crick

No he doesn't get separated from the service; but I'm selfish, I'm looking at it from a CONARC standpoint. I'm attempting to save CONARC some money.

LTC Qualls

You're not saving CONARC some money.

Mr Crick

I'm saving the training base money.

Mr Gillespi - CONARC

I think the major problem we have had in the training base is this constant turmoil. If we can get a man out, even though he is being paid, he is being paid in a productive status, then that is a saving. If I only have to put five men through the training base, where before I had to put ten men through, that is a savings.

LTC Qualls

Fine, I can see that; but now we'll go back to the other point of view. You are generating additional turbulence, that's the basic problem. You have to have men, material, and money. We don't have men because they are perpetually moving some place.

Mr Gillespi - CONARC

Well, this helps stop the perpetual motion.

LTC Qualls

Not particularly.

Mr Gillespi - CONARC

Well, if we make them productive longer; for instance, instead of keeping a man in the training base for 16 weeks he is put on the job 8 weeks early; he is there a longer time and we don't have to put as many through the training base.

Mr Crick

Basically, any time we talk about self-pacing instruction we always look at the savings. It could be that the savings we are looking at may be artificial; but we take the days saved, times $32 or $33 per day and come up with thousands of dollars. We at the SESS firmly believe that we are turning out a better man. You may have a point here - we may be wanting to say we are giving a better man to the field as opposed to how much money are we saving.

LTC Qualls

Then let's capitalize on professionalism. Don't capitalize on saving you, the SESS, $50,000 this year because I don't get $50,000 more to take care of this man, and literally somebody has to do it.

Mr Crick

Well, I think truthfully the school operates on a lower budget.
Our paycheck is based on the average training load. When our
training load is down we get less money. Now what CONARC does
with this money, I don't know - I'm not concerned. I'm concerned
about the school trying to turn out a better man.

LTC Qualls

Well, I'm not trying to start a fight but that is exactly where
we are. People all get concerned about right here, and that's not
where the concern is - the concern is getting a professional
military service stable around the world. It's going to take a
broader look than our immediate individual concern to do it.
We, the trainers, the educators, have to start this philosophy.

Mr Crick

I can't argue with you - you have a good point. Only to say
possibly, in the outset to get approval to conduct some of these
pilot programs, the best way to get approval is to tell someone
you are going to save them some money.

LTC Qualls

Right - but we start on a false premise and we lead ourselves
down the path to problems.

Mr Crick

From a school standpoint, I don't think it's a false premise.
If we can get a man out in 16 weeks as opposed to 21 weeks, some-
where we are saving some money. Who else is spending it, I don't
know.

LTC Qualls

But originally you had to have this installation built because
you had to have a capacity for a certain number of people.

Q - Mr Senn - Aberdeen Proving Ground

You stated that you felt you were turning out better people.
On what basis are you making this statement?

A - Mr Crick

I would rather not get into that because now we are talking
about SESS. We will have some people next session that will
answer that for you; but basically, our quality control program
is the instrument we use to evaluate our product.

Q - Mr Cortner - Ft Bragg

Our Navy presentation said it takes approximately two man-years
to create one week of individualized instruction to replace a
conventional course week. Now, where within the Army, are we
going to justify these two man-years? Then, when we put the
individualized instruction into effect, presumably we have lower
student load and we have reduced authorization for instructors.
We are presumably going to be required to update our individualized
instruction but we have fewer instructors to do it. It seems
to me that the schools may be in an impossible situation under
the present Army Regulations.

Mr Wellford - Ft Huachuca (Comment)

I'm not sure we are really talking about a two man increase
in effort in order to accomplish the individualized instruction.
If we just live with out present concept of a systems engineered
program, I imagine we are something in excess of one man-year
for a week of conventional instruction. I don't have the figure;
I just wondered if somebody else had. We always undertake to
develop man-years-of-effort tables of a new technique, new efforts,
but the conventional program that we have been doing for some time,
probably, we haven't studied to see how much time is being taken
to develop that type of course.

Mr Crick

That's a good point. Several years ago we heard the figure for
programmed instruction was 100 to 1. A hundred hours to develop
one hour of programmed instruction. Someone from HumRRO once
told us that the conventional instruction was costing us 40 to 1.
What study this was based on, I don't know; I just heard it one
day in a discussion at CONARC. If this rings a bell Dr Smith?

Dr Smith

It doesn't ring a bell but all you have to do is see the type of
course maintenance that goes into the maintenance of the conven-
tional course. Just take a look at the number of times your POI
changed. The rate of POI change is a good indicator of the time

and effort that goes into developing new lesson plans, getting
new visuals, and etc. My casual observation is that there is an
enormous amount of POI changes going on all the time. Also, I
suspect that the Navy was somewhat on the expensive side due to
the use of multiple media in just about everything. That, as
Mr Weingarten pointed out yesterday, is not necessarily a feature
of individualized instruction.

Mr Crick

I have one other comment concerning your question, sir. I think
we at the SESS are suffering on this drawdown on instructor personnel.
In the next session you will hear some figures of what it cost us
in terms of man-hours to develop our self-paced courses. Basically,
what we did was take the people the staffing guide authorized for
curriculum development, POI review, etc., and have them develop
self-pacing programs. We did this without an increase in personnel.

Q - Mr Speights - Sheppard Air Force Base

I wonder if the Army, CONARC, has a concept or policy of training
instructor or instructor supervisor cadre to do this type of thing
you are talking about; or if they don't, plan to have such a policy?

Mr Crick

What plan are you speaking of now, sir?

Mr Speights

Individualized instruction planning and the systems approach on a
broader concept. The actual work to develop the courses.

Mr Crick

Here at USASESS, and the CONARC service schools that I am familiar
with, we have a basic two-week Instructor Methods Course. This is
a course developed from FM 21-6. We are in the process of systems
engineering that course so that it may be less than two weeks.
We send a newly assigned potential instructor through this course,
we make a basic instructor out of him, and then he goes on to the
job, or on the platform, if you will. If he goes to one of the
courses that you will hear about today, a self-paced course, he
gets a program on how to be an instructor in a self-paced course.
After the man has been on the job for a few months and is doing
instructor duty in either self-paced or group-paced courses, he
is then sent to the various follow-on courses, such as systems
engineering, performance test preparation, developing duty-oriented

objectives, or preparing programmed texts. What we try to do is give him additional training in jobs other than basic instructor. To my knowledge, CONARC does not have a pamphlet or a regulation which prescribes what must be done. It's up to each individual school. Maybe, Mr Monnes, you can tell us how the Navy operates.

Mr Monnes

As I pointed out in my portion of the session, we are in the process of completing a development of three different courses in this area. One of them is how to do a job task analysis. We think this is more important in conjunction with the systems engineering approach for individualized learning than for conventional course design. That course has completed its validation and is producing people to do the job task analysis for this splice project I mentioned.

We have a second course, that has been in operation for about 5 or 6 months. It trains the individualized learning development personnel and how to write learning objectives. These learning objectives for an individualized system must be very precise. In fact, they are so precisely written that, with just a slight amount of editing, they become the test items for our written and performance test in the system. Our third course trains our developmental personnel to develop media from these learning objectives. It might be interesting to note that they take the learning objectives, write the test items, the PI material, and the narrative text and finally end up with the summary. They go through by step process to do these things. It also gives them some background in selecting audio-visuals that are required to support or be alternate paths in this multi-media system. Our fourth course is a learning supervisor course that takes previous instructors, or instructors for the first time and, in essence, brain washes them. It gets them to forget about their chalkboard routines and develop good counselling question and answer technique. Our fifth course, which we do not have too much to do with, trains personnel in the system approach to training course design.

MANAGEMENT AND CONTROL
OF
SELF-PACED TRAINING IN THE SESS

COL Robert Bean, USASESS
1LT Roland L. Connolly, USASESS
Mr. John D. Danilovich, USASESS

All of us in the CONARC school system have a common objective:
(Slide 1 On) To increase the effectiveness and reduce the cost of
training. (Slide 1 Off)

Here at The Southeastern Signal School we are satisfying this objec-
tive through the systematic design of curriculum, which we call
(Slide 2 On) system engineering, and through the self-pacing of
training. Presently, we are operating five courses on a self-paced
basis, and we are in the process of developing other courses under
the concept of self-pacing. (Slide 2 Off)

At The Southeastern Signal School, we started developing self-paced
training some four years ago. It was apparent from the start that
the control and management of self-paced training called for the
employment of uniquely different concepts and techniques. It is
these empirically developed self-pacing management controls and
techniques that LT Connelly and Mr. Danilovich will now present.

(LT Connolly)

We feel that you must first have a basic understanding of our in-
structional system before we discuss our self-pacing management
controls and techniques. The TV presentation you are about to see
(Signal for Part A) is intended to provide you with a visualization
of this (Slide 3 On) instructional system.

(TV Part A: The Instructional System)

(TV.........As a brief orientation to his equipment)

(LT Connolly)

The learner is here at this point (indicate on slides). He will
next start learning as indicated by this block.

(TV.........Unit of learning within a lesson)

(LT Connolly)

A discrete unit may be thought of as a main point in a lesson plan.
When he finishes the lesson segment, his progress will be checked.

(TV.........then administers an informal oral quiz and criteria).

(LT Connolly)

The oral quiz varies in detail with each individual. It does, how-
ever, provide each learner with constant feedback and reinforcement
and keeps the instructor informed on each students progress.

(TV.........until the lesson is completed)

(LT Connolly)

Our programs are self-paced because each learner uses a non-time-
based medium, a printed learning guide. The student continues
through this loop until he nears the end of the lesson.

(TV.........which is immediately critiqued for him by the instructor)

(LT Connolly)

The quiz enables the instructor to evaluate the students comprehension
of needed technical and theoretical information. If weaknesses are
spotted, the instructor tutors the student as required.

(TV.........learned from the just completed lesson)

(LT Connolly)

The criterion is, essentially, a mini-performance test, based on the
standard of the training objective. The student must satisfy the
training objective before he can proceed to the next lesson.

(TV.........until the annex is completed)

(LT Connolly)

During the entire training cycle, the instructor functions as a
manager of the learning situation - providing feedback, guidance
and tutorial instruction as needed.

(TV.........an in-depth comprehensive quiz)

(LT Connolly)

This quiz is a composite of the lesson quizzes given during the
annex. For this reason, it may be considered a post test. It is
primarily, however, a diagnostic test, for it discloses student
weaknesses and indicates what the student should now drill on and
practice which follows, constitutes a quality control check for
the section.

(TV.........on the equipment and the student locates them)

(LT Connolly)

These, of course, deal with the student's indicated weaknesses.

(End of TV, Part A)

(LT Connolly)

Certain management controls must be exercised continually as students progress through self-pacing courses. The most significant of these is, what we call, the progression index. Each student's progression index is computed as he completes each of the annexes of instruction. The index is a gauge of the student's progression in relation to the specified allowed training time. (Slide 4 On). This is the formula we use. "H_E" represents the time in hours expended by the student since he started training. "A_T" stands for the total hours the student has been absent from class. "H_A" represents the hours allowed for training, and can be thought of as the hours it would take if a student were in a group progression program. Let us examine briefly three situations, involving 100 hours of allowed training time, and see how the progression index is computed. In Example A, the student has taken 110 hours and has been absent for 10 hours. His progression index is 1.0. In B, Speedy has taken only 90 hours to complete the training and has been absent for 10 hours. Speedy's progression index is 0.80. In the last example, Slow Joe has taken 120 hours and has been absent for 10 hours. His index 1.10 (Slide 4 Off). It must be pointed out here that, although absenteeism is not included in the progression index, strict controls are exercised to keep absenteeism to a minimum. Progression indexes are posted to both the student training record and the summary training record. (Slide 5 On) the progression index is also used as the primary determinant for attrition decisions. Normally, if a student's progression index reaches 1.30, that is, he is taking 30 percent more than the allotted time, we recommend that he be reported for reassignment, or enrolled in another course within the school. (Slide 5 Off).

(Mr. Danilovich)

Absenteeism (Slide 6 On) is, as previously mentioned, an aspect of self-pacing that must be watched closely. We do not intend to explain our control system in detail. Suffice to say, the instructor calls roll twice daily, and during the day continually checks for any change in the attendance status. If a student has been absent from class, other than for taking a break, he must bring an absentee slip back with him. The date from the slip is posted to the summary training record and the slip is then returned to the originator. (Slide 6 Off).

Breaks (Slide 7 On) in our self-pacing programs, are taken on a non-scheduled basis. In this way, we do not interfere with the student's learning. When a student desires to take a break, he is required to obtain a break pass from the instructor and then sign out on a break log. When he returns from the break, he logs himself in and returns the pass to the instructor.

Because we have five periods of instruction before the lunch period, and three in the afternoon, the student is allowed 40 minutes of break time in the morning and 20 in the afternoon. The number of breaks is not specified. However, the learner may not take a break in conjunction with the end of the morning or afternoon session. (Slide 7 Off).

(Mr. Danilovich)

We have found that the majority of the better educated students and those with good battery test scores, progress at the fastest rates. This is as expected; however, some of these same students also progress at the slowest rates. (Slide 8 On) We realize there are many intrinsic psychological factors which may cause such students to progress slowly; and for this reason, we have provisioned for developing positive learning attitudes by using most of Dr Mager's propositions for developing attitudes toward learning. In addition, we have counselors assigned to all students. Normally, one counselor is responsible for approximately 10 students. The counselor checks each of his assigned students at least once each week and is responsible for counseling them as long as they are in the course. We also employ a number of extrinsic motivational stimuli. One of these concerns special recognition, another involves career prog-ression, which of course, results in an increase in prestige and earnings, and the last has to do with sharing in the time saved. In the case of promotions, we do not simply promote students arbitrarily; rather, we do so in accordance with an army regulation, AR 600-200, which stipulates how student promotions are to be handled. (Slide 8 Off)

(LT Connolly)

Rarely do disciplinary problems arise in our self-pacing courses. However, when one does, a "star" (Slide 9 On), a student action report, is made out by the instructor. This report is reviewed ob-jectively by the course manager. The report is then forwarded to the student's company commander. He, in turn, interviews the student and takes the action he deems appropriate. A serious incident will, at least, cause the student to lose his graduation promotion. (Slide 9 Off)

1.0

4.5 2.8 2.5

3.2 2.2

3.6

4.0 2.0

1.1

1.8

1.25 1.4 1.6
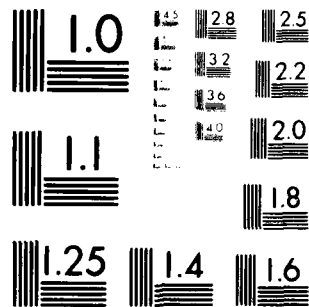
MICROCOPY RESOLUTION TEST CHART

(Mr. Danilovich)

One of the most important managerial techniques we have developed
pertains to forecasting a student's availability, that is, when he
will graduate and be available for assignment. (Slide 10 On). The
present system requires that we submit availability reports 7 weeks
prior to the student's graduation. This requirement, along with
Public Law 51, poses special problems for a self-paced course. The
problem is not as great, however, in longer courses. In a 20-week
course, for example, a student can establish a progression index of
0.50, that is, take only 10 weeks to complete the course. His
availability, however, will have to be submitted after he has been
in the course only 3 weeks. The faster a student progresses, the
earlier must his graduation be forecasted. At present, in shorter
courses, 14 weeks or less, the system we have developed cannot be
used fully due to the 7-week notice that is required. If the avail-
ability reporting time were shortened, say, to 2 weeks, then a
student in a self-paced course 10 weeks long could complete the
training in half the time. It would still allow 3 weeks for estab-
lishing a relatively accurate progression index. (Slide 10 Off)

(LT Connolly)

This is the exact formula (Slide 11 On) we presently use to forecast
availability. We will work one forecasting problem to show how the
formula functions. Let us assume that Speedy is progressing at a
0.60 index. He has been absent for 20 hours during the period in
which he has completed 200 hours of instruction. The training
program is specified as being 700 hours in length. The 20 over 200
is an absenteeism index representing recurring type absences which
must be provisioned for in the forecast. The denominator, 38, repre-
sents hours per week. The computations result in an answer in weeks,
in this case, 9.21. The student will, therefore, graduate approxi-
mately 10 weeks from now, and we will have to submit his availability
date in 3 weeks. (Slide 11 Off)

(Mr. Danilovich)

By rounding the 9.21 weeks off to the next higher whole number, we
are saying that the student is expected to finish his training some-
what earlier than we forecasted. (Slide 12 On). We do this for a
number of reasons:

1. To enable the student to have a formal graduation.

2. To provide a margin for slight delays.

3. To sample, informally, student proficiency at the end of the course. Occasionally, our forecast is inaccurate to the extent the student finishes even a bit earlier than we would normally expect. (Slide 12 Off). (Signal for TV Part C) This short TV presentation shows how we employ students who finish before their forecasted graduation date.

(TV: Part B - Students Who Finish Early)

(LT Connolly)

In our self-pacing programs we employ Go/No-Go grading. Yet, we still are required to rank our students for honor-graduate and promotion purposes. We use the following formula (Slide 13 On) to derive an academic ranking score. In this formula, "PI" represents the students overall progression index and "F" the number of tests on which he was No-Go. Thus if a student has completed the course with a 0.90 progression index and had one No-Go, he would end up with the ranking score shown. (Slide 13 Off). Additional information concerning Go/No-Go grading and academic ranking score can be obtained in The Southeastern Signal School presentation titled "Go/No-Go Grading".

(Mr. Danilovich)

We employ a number of techniques to optimize our self-paced training programs. (Slide 14 On). Optimization, as we use the term, means developing the most effective and efficient program as is possible within our capabilities. We have found that once we have satisfactory criterion test results, we must immediately redistribute training time allocations on a weighted average basis. The reasons are that our progression indexes must be accurate and we must establish a comparative base for assessing subsequent training changes. (Slide 14 Off)

(LT Connolly)

When we first set up a training program, training times must be estimated; and under group-paced instruction, these estimates are amazingly accurate because they are controlled by the instructor.

When we apply these same times to self-paced instruction, however, we find that none of our estimates are correct; and therefore, we must reapportion times according to what the learner actually requires.

Time adjustments are made on a periodic basis, usually every 6 months. The adjustments are based on data pertaining to 50 or more students.

In this example (Slide 15 On) we show only 3 annexes. The annex PI
is related to the presently allotted POI hours. This means that, in
A it took 85% of the 60 hours, on an average, for the students to
complete the annex; in B it took the 40 hours allotted, and in C,
the students averaged taking 10% more than the 25 hours. Yet, for
all 3 annexes, the average PI was 95. This then becomes the PI we
wish the learners to take through each of the annexes. To readjust
the time, we use the formula shown here (pause) the computation for
Annex A is shown. By using the weighted average approach we see
that the adjusted POI time for Annex A is 53 hours. We do not
change the POI officially at this time. This will be done annually
as we determine what the truest time allocations are, or whenever
the POI is submitted for a major revision. (Slide 15 Off)

(Mr. Danilovich)

Often, what is considered to be a relatively insignificant change
will significantly influence achievement or training time in a self-
pacing program. For this reason, in our self-pacing courses, train-
ing managers and instructors are constantly kept apprised of the
test and time results for individual classrooms, annexes, and course
overall. In this way, adverse trends are corrected as they are
detected. For example, (Slide 16 On) as seen here, all annexes are
showing acceptable results except D and E. Average annex progression
indices involving 30 students or more, are shown on the vertical
axis, and test results in percentage of these students who pass the
annex test are shown on the horizontal axis. We have empirically
established that a range from 5 to 20 percent failure is acceptable
initially. Annex "D", we see, has a high failure rate, but at the
same time, the average progression index is quite low. In this
case, we have to find out why the students are rushing through this
annex and not learning satisfactorily. Annex E, on the other hand,
has a high progression rate but a very low failure rate. Here we
have to find out why the students are, apparently, being overtrained.
(Slide 16 Off). Once an area has been identified as being unaccept-
able according to our data, we attempt to isolate the cause.
(Slide 17 On). If the indication is undertraining, we first strive
to see what areas are showing up as weak on our performance tests.
We determine then what objectives are involved, which leads us to
the specific lessons. We next determine if a weakness exists in the
material intended to satisfy the training objective involved. If the
training material is satisfactory, we examine the methods and media
employed. Any weaknesses detected here are corrected. It is
possible that the undertraining is resulting from a laxity in
achieving progress checks. So we also check to determine if the
students are progressing on an artificial basis. If the situation
is one of overtrain, we check to see if the training material is too
"fat", that is, training is too redundant or calls for an excessive

amount of drill. We also check to see if the tests are, in fact, identical to the training material. If too much time is being used and an excessive number of students are failing the test, we first determine why the students are failing. Then we check for misuse of time (Slide 17 Off).

We have talked about the various specific management techniques and controls that we employ in our self-pacing courses. (Signal for TV) Prior to summarizing this presentation, however, we would like you to see the management devices we use, why and when they are used, and who uses them.

(TV: Part C - Devices and Controls)

(COL Bean)

We have found the management of self-paced training programs to be challenging, but well worth the effort. (Slide 18 On)

Our feedback, both internal and external, indicates that we are turning out a better specialist than we did before. We have realized significant savings in training time which has resulted in the $52,000 shown. This pertains to student hours saved during a 7-month period in one course. We have experienced these savings primarily because of our accuracy in forecasting, which is approximately 90% accurate. This is a real savings in that the majority of our graduates are on their way to job assignments immediately upon graduation.

The students in our self-paced courses display extremely positive attitudes. No longer do we have the problem of the sleeping student. (Slide 18 Off). We are enthused with our results and challenged by the self-pacing concept. Hopefully, one or two of the techniques we have presented here will have meaning for you and assist you, when and if you self-pace your training.

Thank you:

QUESTIONS AND ANSWERS

SESSION #4A - Administering and Managing Self-Paced Training Programs

Q - Mr. Wallace - Navy

I got the feeling that for the higher achievement you promote a man
at the end of the course. What do you mean by promotion?

A - COL Bean

They get an enlisted promotion; get upped one grade. In other words,
if they come in as a private, they will more than likely be a PFC
while enrolled in the course and then at the end of the training be
promoted to E4 or S4.

Q - Mr. Wallace - Navy

These were only the students that completed the course in the least
time or do you have some factor to take care of the slower
student also?

A - Mr. Danilovich - SESS

We showed only the academic ranking score. Promotion really depends
on AR 600-200 which covers the limits of promotion in various types
of courses, according to the military specialty involved. According
to whatever the AR stipulates, we take a cutoff on the academic
ranking score and promote accordingly. The academic ranking score
does consider progression index.

Q - Mr. Wallace - Navy

So, slow students, changed within the predicted time of completion,
would be promoted equally as did the fast student.

A - Mr. Danilovich

Let me say, that in our course, we do so; that is, if he completes
the training in our course which is 21 weeks in length with a
Progression Index of 1. If he finishes in 21 weeks (that's
training time) and has had no failures, we now have a 1.0 cutoff,
and he is promoted; but this is subject to change. We are working
in this particular area and don't have the answers yet.

Q - Mr. Weingarten - HumRRO

What is the rationale for counting failures in your program?

A - Mr. Danilovich - SESS

We don't want students to rush to the test area in an attempt to get a lower grade through the index. We think that this is a maturity-tempering device. That's the prime reason. We don't want the student to rush, fail, and cause us an excessive amount of work bugging equipment, clearing the bugs, and then have to do the training over anyway.

Q - Mr. Weingarten

The reason I asked is that we have a similar question in the Field Wire Course at Ft. Ord of the method of selecting the honor graduate. We had people with 100% scores but they would have to adopt a new technique. The candidates for honor graduate are people who have passed all the tests the first time through and often there are more than one of those. Then they put those who tie through the test again and have a process of elimination. I feel that this is inappropriate to the spirit of the system. I wonder about the logic of penalizing the student in this manner.

A - Mr. Danilovich, SESS

Well, you say we base training on mastery: however, our management objective is twofold, that is, increase effectiveness and reduce the cost of training. So we are attempting also to reduce cost, and cannot tolerate overtraining situations. That's what would happen if the progression index were not significant. In contrast, we feel we need a system of checks and balances. That's our logic. I don't know whether it's valid or not.

Q - Mr. Dare - Aberdeen Proving Grounds

I take it you develop your progression index by annex. Am I not also correct that this is cumulative indexing?

A - LT Connolly

Yes, we have this computed by annex. Each student has a cumulative progression index which follows him through the course, and each annex has its own average progression index.

Q - Mr. Dare

So when he receives his report on the progression index he also receives his cumulative index?

LT Connolly

Yes Sir.

COL Bean

That's done as he completes each annex: at that time, they compute his accumulative index.

Q - COL McDonnell, Commandant, SESS

On this promotion of students, this has given us a little internal heartburn in that the instructor in many cases is the same rank as the student. Yet, when the student graduates in the top percentage of his class, he is promoted and the instructor is immediately ready to throw in the towel. But we are going down two different paths. Go to the other end, the receiving end, and you have a Signal Company. You have a group of good people, people you know, and this month you anticipate a quota to promote SP4 Jones who is doing an outstanding job. Then all of a sudden a student from the Signal School comes in who has been promoted to SP5 and fills the vacancy. That's pretty morale destroying. I can't do anything about it.

A - COL Bean

We also have another problem in the promotions. If the man completes the course at a rapid rate, sometimes he is not eligible for promotion due to his time in service. We had this case this week. We had to delay the student a week in order to get him promoted.

Q - COL Voss - Ft. Lewis

This is a problem I don't think we are addressing. We are talk-ing about OJT and, as funds get tighter and tighter, we are conducting OJT more and more. We have a Signal Brigade that's doing an awful lot of OJT and they have go-no/go testing that the Colonel administers from the leadership point of view. I guess maybe we are going to discuss it more when we talk about the next phase, DA Control Processes for Students: but, if we are going to have centralized promotions from PVT E1 up administered from DA, then we have an awful lot of intervening paperwork that we don't have a lot of use for today. Commanders are being told they have their authority and responsibility back. This kind of option that you can promote after looking at a man for 20 weeks, which is admittedly a rather long time, while we are looking at him for years I just can't see. I don't know where the answer is but I wonder what kind of interplay you're having. Are you from a school point of view sending back your comments? Are you not really sure that promotion at the end of training is the way to go?

A - COL Bean

We definitely feel that as a motivation factor it is one of the overriding factors that we have today. As far as I'm concerned, personally, I'd like to see it remain as it is, or, if a student advances at a more rapid rate, put something in front of him to motivate him. How this will affect the field, I have not studied that area.

COL Voss - Ft. Lewis

This is very near the carrot if you will that - We are focusing in on today in our training aspect and our country club approach. We are not paving attention to what the TO&E man who spent his year or more, probably in combat already, who is the lifer, if you want to use that term, what is happening to his carrot, it's shriveled, faster and faster. The good fresh ones are being gobbled off early. We the trainer, we the educator have a problem too, as well as we the leaders.

COL Bean

We definitely would have a problem in the nonreal technical field. But in the maintenance field most of the TO&E positions are rated E4 and higher so we don't really have this problem. Look at the Teletypewriter Repair, I don't think we have PFC's authorized in the field; so, if we promote them, they just get promoted before they get on the job.

COL McDonnell

I'd like to use a different word than lifer, let's call him a professional. There is one other viewpoint that I agree with to a certain degree. Because, and I'm almost contradicting my earlier statement, promotion in the field because he's there and doing the job doesn't necessarily mean that he is doing the job according to the MOS job description. Now we feel pretty touchy about this because we have this problem with the 31Z man who is the senior communicator in the field, at an E7, E8, and E9 rank. We now have an abundance of 31Z in the Army, because in Vietnam, our Signal Battalion Commanders were promoting the man who was doing the job. He was not necessarily qualified for broader scope jobs that the 31Z job description covers. We have all sorts of problems here too.

COL Voss

Here's where the responsibility should be. If you are in a Signal Brigade you should be able to take the promotion from a man who isn't qualified and give it to the man who is.

COL McDonnell

That's great if I had control of assignment procedure, but I don't.
I take the people that DA sends me. I get 20 people all less
qualified than the MOS book says they should be, but they are all
I have. All I'm saying is there is a big dilemma here, and it
must be recognized. I agree with COL Bean, promotion is the
best incentive we have but since I'm not a Department Director I
look at another area. I must look at COL Cloutier's instructors.
I'd like to see some rules where instructors could be promoted the
same way.

GEN Hunt

I know that you're not up-to-date on promotions because the policy
just came down last week. This is very important. We now have the
up or out policy, as you've heard - the quality control, down to the
level of E2. If the man is not promoted to E2 at the end of 8 weeks
then administrative procedures may be taken to eliminate him from the
service. If the man isn't going to hack it at the entry level, then
he just gets to be a problem as he goes on. Then after 4 months
which includes basic training and AIT - then 4 months after he's
promoted to E2 he must be promoted to E3 or the up or out policy is
invoked. The procedures for doing this have not come down to you
from CONARC but there will be a report coming soon. When you go
one step further the E4 has to make it at the end of 3 years. The
question, as I see it, is quite intriguing. Will we promote the E4
while the entry level man is in school and in the top 10% of your
MOS producing courses as an inducement to get the best men to go
from one level to the next and to reward excellence, or will we
withhold that and let the man in the field who has produced in the
job and on the job training get a promotion? And what I had thought
that by limiting it to 10% they have not given carte blanc promotion
authority but they still have the carrot out for motivation. I've
talked to a lot of enlisted men, and to be quite frank, the motivation
for promotion is the highest motivation you can get. This puts money
in his pocket - from $50 to $75 a month. An enlistment is several
thousand dollars. But I'd like to hear more about this problem that
keeps cropping up from others here. I'm not convinced that it is a
problem. I'm convinced that if you're going to get the best quali-
fied men to continue MOS progression you have to handle it carefully.
Would anyone like to discuss that further? The only reason I stood
up was to explain that we do have a quality control at the level of
each 4 months he must become a need, and 4 months after that he must
become a need, and then at the end of 3 years he must become a need.
Putting that equations into your thoughts is there anybody else that
would like to discuss this?

Q - MAJ Gutzman - Ft. Polk

I just have one question. As I listened to this presentation and
hear that these people being promoted to E4's based on their academic
standing. now do you weigh into this a company performance rating?
In other words, you can get the honor graduate and he could be a
clown.

A - COL Cloutier. DOI, SESS

We address here what we call a whole man concept - a man reaches
eligibility for promotion based on his academic effort. I said he
reaches eligibility. Then, he is presented to his Company Commander -
his Unit Commander - as being eligible for promotion. We have a
form - or we have a process which involves both the academic side
and the command side and together we come up with what we call a
whole man concept, from the standpoint of him as a soldier as well
as a student. We have had many cases when a man ranked highest
academically did not get promoted because of other factors involved;
disciplinary problems, how good a soldier is he, etc. So this does
weigh - physical training included. This is the whole man concept -
his deportment, his conduct, his desire to participate in the unit,
this is all part of the evaluation. It's time consuming because we
spend a lot of time on it, but we feel it's very important. We do
not just look at his grades in the classroom. We absolutely do not.
Does that answer your question?

Q - MAJ Gutzman - Ft. Polk

Yes Sir, except maybe you here are not faced with very short self
paced instruction. I have people that complete MOS courses in as
little as a week and 2 days. I've got this man out of BCT and have
him a week. He may come out the honor graduate or he may come
out with a fantastic score for that particular input group. Do you
have a method of handling this type of people?

A - COL Bean

I have the same problem you have. I have to hold him over and
utilize him in the final shop as a repairman or as a peer instructor
until he meets the DA requirement for time in service. I cannot
promote him. That is a problem that will have to be addressed from
DA level.

Q - MAJ Deghman - Ft. Jackson

In this respect is there anything being done to address it to the
increase in self-paced programs. You are making use of your personnel

and the clerks are being readily used and there seems to be an over-
all shortage but with the increase of self-paced programs, what if
the post cannot use them effectively?

A - COL McDonnell

Well, I would submit that the man you are talking about only reaches
eligibility academically. He doesn't reach eligibility other ways.
Our shortest course is 5 weeks. The only thing we do when a man in
that condition completes a course in self-pacing, in good academic
condition, but is not otherwise eligible, we put a comment in his
records and send him on to his next command. His next commander
judges his performance and eventual promotions given to the man.

Dr. Hunter - HumRRO

It doesn't have anything to do with promotion but it does have to do
with utilization. There is a movement afoot in DA to amend Public
Law 51 which will require an act of Congress, which isn't very darn
likely, but the amendment would permit overseas assignments after 8
rather than 16 weeks of formal training, in non-combat zones. Chances
or prospects of this are pretty dim.

COL Bean

I can see where the school with the short courses would have a
problem with promotions under the current program.

Mr. Crick

I might add, with the man finishing basic training, going on to AIT,
completing AIT from 1 to 2 weeks, which gives him 10 weeks training
toward meeting Public Law 51 requirement. The AG school suffered
with this 3 years ago starting with the self-pacing of the clerk,
clerk-typist, and personnel specialist. During that time, I
happened to be assigned to CONARC and was the project officer from
the CONARC standpoint. COL Hornbuckle, from the AG school, and I
made many trips to the Pentagon talking to the assignments people,
trying to solve this assignment problem. The best we could get,
was if this man received a CONUS based assignment, he could ship
out. However, if the early graduate was assigned to an overseas
assignment and Public Law 51 was involved they told us we would
have to OJT the man until Public Law 51 had been satisfied. Now,
at Ft. Knox, they established an OJT program in which these
clerks and clerk-typists were sent to the hospital and other offices
on post as clerks and clerk-typists. The hospital kept the phones
busy to the course every day wanting more of these early graduates.
They were doing an outstanding job. I'm afraid that until something
has been done with the Public Law 51 law, of less than 16 weeks it's
going to be OJT. As long as we are dealing with courses that are
16 weeks or longer there appears to be no problem.

IV-104

COL Bean

The management tool of utilizing the test scores in conjunction with time allows the course chief a management tool, much better than the current group progression management tool. We have been able to find out that we have a new instructor in the classroom, after three or four men take a test and fail no/go. This is reported to the course headquarters and they immediately go into that classroom and find that they have to do some more work with that instructor. I think that this is the greatest factor we have found in the manage ment tools that we currently employ.

COL McDonnell

Bob, I would like to put in a plug for you at this time even though you may not appreciate it. COL Bean's department has two tours. One has already been conducted. Another will be conducted tomorrow morning between 8:30 and 10:30 in his department. He will be very happy to show you this self-pacing instruction.

COL Bean

My Course Chief, here, said he would give anybody $50 if they could find a sleeping student. I haven't been able to find one.

Q - MAJ Gutzman - Ft. Polk

How do you handle your REP personnel that come through your course? What kind of a promotion carrot do you give them? Most of these REP personnel will be going back to REP units.

A - Mr. Danilovich

I'm quite sure the REP units handle it themselves and recommendations go back.

COL Cloutier

These are in the minority. We don't have that many and we do not have promotion authority.

COL Bean

They are a faster student. They will progress - the incentive to get back home will make them breeze through most of the courses. They go back the day they finish the course. We do not require them to wait for a formal graduation.

COL Cloutier

We have noticed in our training of the Guard and Reserves, that, promotion is not an incentive. The biggest incentive with them is the sooner you complete the training the sooner you get back. That is universally accepted by these people and they respond to that incentive.

Q - Mr. Lantz - Ft. Monmouth

I have a minor point. I thought your presentation was well organized and presented; however, I was still not able to copy the equations that were on the screen. Is it possible that they are in the material that we got here.

COL Bean

If you would like to have a copy, I will get one for you. Also these equations are in our handouts located in the rear of the room

COL Cloutier

I would like to say for those of you who have not seen it, we have a presentation on GO-NO/GO testing in which we further develop the formula at some greater depth. The formula presented here was merely to show you that we do have a mathematical or a systematic approach. In our GO-NO/GO testing we do go into the development of the progression index which is the key - the heart to this system. It was presented once this morning and will be presented again tomorrow. I recommend this presentation to you gentlemen who are interested in that aspect.

Q - CPT Palmisano - Ft. Knox

My interest is in Basic Training. After the first of the year, CONARC is expanding the basic training program and even now associated with that program we have been instructed to look into self-pacing, programmed instruction, peer instruction, Go-No/Go testing. I'm interested, Mr. Weingarten especially, or anyone else who has information on whether or not research is being done, or has been done, in this area with regard to basic training? Everything we have heard thus far has been MOS or AIT.

Mr. Crick

I think you're talking about the April 6 CONARC letter, which estab--
lishes the guidelines for a complete revision of BCT and AIT training.
Ft. Ord is currently conducting experimental training in BCT and I
think the Infantry School is probably testing the program. CONARC
tells us that from this program will come a revised BCT. Once the
proponent schools receive a revised BCT Program (Army Training
Program 114) we can then start systems engineering and reevaluating
the army subject schedules. At this particular point, according to
milestone schedule, the proponent schools will get with the ATC
concerned and discuss various methods of presenting the instruction.

Q - CPT Palmisano - Ft. Knox

This experimental program - In which areas exactly is this enjoined
with the self-pacing, peer instruction or all of it?

Mr. Crick

Being at a service school I have very little knowledge of what is
transpiring at the BCT level, but I do know that at Ft. Ord some
parts of the BCT is under the APSTRAT or Peer Instruction concept.
How much I don't know. Also in the test program various methods are
being used. I think the primary purpose of revising BCT programs is
to do away with the lecture method and go to as much hands-on training
as possible.

QUESTIONS AND ANSWERS

SESSION #4B - Administering and Managing Self-Paced Training Program

Mr. Crick

Throughout the 5 previous hours we have been listening to presenta-
tions on self-pacing, and we keep hearing the word motivation,
incentive, etc. To lead the discussion of the SESS presentation, I
would like to present the motivating force behind the SESS self-
paced program, COL Robert Bean, Director of the Communication-
Electronics Department, COL Bean.

COL Bean

Gentlemen, these management and control techniques offer us something
in self-paced that we don't have in group type instruction. We can
look at a time factor. This "time" is one of the important factors
and the "results of the tests" is another. We can put the finger on
the individual instructor in the classroom for not teaching the
student or double checking and counseling the student properly. It
gives us factors, as managers, that enables us to control the instruction.
Before, we presented instruction to him, gave him a written test, and
evaluated his written test; but here, it is completely different. You
can evaluate a task that the man actually performs. We have had great
success in our management and control techniques. At this time, I am
open for questions.

Q - Mr. Gillespie - Ft. Monroe

Sir, I wonder if one of the members of the panel can tell us the
percentage of the increase in the number of instructors that was
necessary when you individualized your course of instruction.

A - Mr. Danilovich

We have had no increase in instructor requirements. I don't know
why, perhaps it has something to do with the amount of practical
exercise we had before. We were substantially oriented to
(roughly 85%) practical hands-on, so we may have had the appropriate
number of instructors to accomodate this transition. But when we
were visited by the manpower survey team, we were the only course in
the school that was not cut. We were then phasing in our self-paced
program, and I guess this had an influence on their survey. We
normally think 1 to 8 is satisfactory. I know it varies in certain
areas; at Annapolis they have 1 to 5. It's different in different
areas. I heard 1 to 22 in one of the sessions. Requirements are
significantly different according to the skills that are involved.

Q - Mr. Gillespie - Ft. Monroe

If that is true, as you say it is, can you give us any guidelines to the types of courses that lend themselves readily to self-pacing?

A - COL Bean

Maintenance courses, i.e., the Communications-Electronics Maintenance Course; in fact, I'm a firm believer that everything in the US Army could go self-pacing tomorrow. It eliminates the wasted time we have in instruction. I've talked to several students who completed other courses and they all feel, after they have seen self-pacing, that this eliminates that sleeping time in the classroom. But, to answer your question specifically, I think the type courses that would lend themselves mainly to self-pacing would be any type repair course. Those are the first ones we should self-pace. Then I think we should move into the operator type courses. Here, you may have some equipment problems. Then I think we should go into courses such as the Officer's Basic, and Officer's Advanced. I think we should look at these immediately for self-pacing. We have self-paced four courses without any additional instructors, equipment, or training media. We have taken what we have and converted to self-paced instruction.

Mr. Danilovich

I would like to address a type I think might not be appropriate for self-pacing. It would be courses that deal primarily with material in the affective domain, where we are talking about the necessity for introspection based on comments from other people. This is something we have to consider as we think about self-pacing, because it is very important that we have group interaction in some areas.

Q - Dr. Crawford - Pres, HumRRO, Alexandria, Va.

The $52,000. Now I'm not critical, but I would just like to know how you arrived at the savings of $52,000.

A - COL Bean

That was arrived at considering that $18 a day is the cost per student.

Q - Dr. Crawford

And this was the amount of time you saved?

A - COL Bean

In one course; that's all we computed. We saved so many training days and put them in the field early. It costs us that much to train a man for one day in the one course we have figures on.

Q - Dr. Hunter - HumRRO

You mentioned an 8 to 1 student/instructor ratio, was there any change in the student/equipment ratio?

A - COL Bean

No Sir, most of my courses are geared for 1 to 1. One piece of equipment to one student. Yet other courses in the maintenance field are geared for 2 for 1 and we've licked that problem by putting two self-paced students on a piece of equipment. Our instructor status is based on the old CONARC staffing guide. That is adequate to meet our requirements.

Q - Mr. McBride - Ft. Sill

What about your instructors? Do they like this procedure better than the old conventional type?

A - COL Bean

This is a major problem that you have to start with. This brilliant platform instructor that you had to start with that gets up and preaches, goes into a self-paced course for the first 4 weeks and he's still preaching to one man. You've got to train him. After they are in it for 6 or 8 months you see them beginning to like it. Before he had 15 hours of instruction a week, now he has 38 hours of instruction per week.

Q - Mr. McBride - Ft. Sill

Do you try to control him on conference time?

A - COL Bean

No Sir, we have no conference. It's talking from instructor to individual.

Q - Mr. McBride - Ft. Sill

I thought you might have the tendency to want to spend a lot of time talking to the students as opposed to placing them on equipment and letting them go to work. Don't you have to do a little supervising?

A - Mr. Danilovich

I'd like to say that once you self-pace, the demand on the instructor's time is governed by the students. He no longer can belabor something as he once did, now he has to be quite concise. It soon becomes apparent that he has to interrogate to identify exactly what this man has as a problem.

Q - Mr. McBride

How do you present this information? In a lecture form?

A - Mr. Danilovich

We have no lectures. We have learning guides, in the frame format, and our own prescription for the frame design. The learning guide is a linear type.

Q - Mr. McBride

We worked a little bit with self-pacing at Ft. Sill and one device that we used was the TV tape player. This gives the instructor a lot of flexibility with a response device. He can run the tape, and if it is apropos, then he can stop or back up; this is in addition to the programmed text.

Mr. Danilovich

We said the learning guide is our primary medium. Quite often the intended capabilities of that medium are overloaded in that it does not provide multiple stimuli. We use adjunctively, on call television. We use other media also.

COL Bean

Each of the courses have up to 150 or 200 short TVR's. We've gotten away from these 30 minute TV presentations. We have 5 to 10 minute TVR's that cover only the one teaching element. These TVR's are on call at the TV studio. The individual will go to a certain TV set, contact the studio, and the studio will tell him to go to channel C-6. The student will do this himself: and within 5 minutes, his presentation will come out through his headset. He uses headsets in the classroom so that it does not interfere with other students. At times we let it blare out because it does not interfere with the other students. They are working on their own problems, so they pay no attention. We also keep music on selected channels.

Q - LTC Bovard - Ft. Knox

Did I understand you to say that formerly the instructors had an
average platform hours of perhaps 15 a week?

A - COL Bean

We tried to keep them on the platform in the old conference method
about 20 to 25 hours. Right now, we put an instructor in the class-
room - that is his job.

Q - LTC Bovard

You mean he is there for 38 hours a week? What about preparation
time?

A - COL Bean

They might let him take off a half a day during a week; but, in general
terms, that is his classroom, that is his job unless the section
wants him to redo some programmed instructions or something of this
nature.

Mr. Danilovich

The man is assigned to a classroom but he is not always there. The
instructor still works on a scheduled basis but he feels attached to
his room and this is where he normally stays. Essentially, he works
with the learners 25 to 30 hours. I'd have to check Form 18's and
19's and everything else to give a definite answer.

COL Bean

It is according to the strength of the section that is involved.
In one course, they are in the classroom the full week if he
is present for duty. In another course, if they have a few extra
ones, they can let one go for a short period of time. We have
no training schedule. All we have is instructor assignments.

Q - Mr. Weingarten

Do you have any jam-ups in your central testing?

A - COL Bean

Yes, at times. In some of the courses you do have because we have
say 4 or 5 test positions for each annex.

Mr. Danilovich

The way it is handled is that we have a certain number of personnel assigned to our central testing. If there is an overload, and this has only occurred once or twice in our course, we send the test administrator out with the man to his original position and the test is administered there. This is only in the exceptional situation.

LT Connolly

You might note that there are jam-ups within the course itself, not just with central testing. You have to allow yourself as much as possible, depending on the prerequisite required in each annex, to be able to skip an annex since it is self-paced and students progress at their own rate. A group of students may jam-up in one particular area and there is no way to make room for a new student. We don't want to make him sit and wait, so we try, whenever possible, to move the student to another annex that doesn't require the prerequisite knowledges of the annex he skips. This goes on continually within our course.

Mr. Danilovich

Another way is expanding the coverage within an individual room. This also eliminates pile-ups.

COL Bean

I think one of the greatest factors about self-paced is that the soldier sitting on that bench has a complete, positive aittitude toward the program. I've never seen anything to equal it. You sit down and talk to him. Normally, in the other type training, he is a little shy. But this soldier will say "Yes Sir, I know how to fix this machine", and he can tell you right off what he is doing. He can tell you what the objective is; what his task is. He can tell you what his progression index is. He can tell you that he is going to finish this 21-week course 2 weeks early at the rate he is progressing. He says "I'm looking forward to getting a three day pass next week," or "If I'm in the top 50% I'm going to get promoted," and he is really motivated. I think that's the grand part about it. There is no time wasted for him.

Q - Mr. Harvey - Ft. Benning

I realize this bright student finished early and the slow student takes more time, but do you still receive students in groups at specified times?

A - COL Bean

Yes, we have an input schedule. And we get the majority of our men on schedule.

Q - Mr. Harvey - Ft. Benning

Do you find that the majority of the class takes the same amount of time to get through the course?

A - COL Bean

No Sir, for tomorrow's graduation exercises we have a 21-week course graduating. There won't be but one or two students that will finish in 21 weeks. The majority of them will be 20 weeks, 19 weeks, 18 weeks, and some of them down to 14 weeks; but there will still be three or four in there that will be finishing in 24 or 25 weeks.

LT Connolly

I might add that this is more dependent on the length of the course. Of course, the longer the course the more they are spread out. In the C-E Maintenance Department we primarily have longer courses than some of your courses might be. We do find that after 2 weeks in our course you can see that they have already started spreading out. It takes no time at all for them to go to a wide range. One of our courses is 27 weeks long and by our attrition type designators we allow 30% overing which comes close to an additional 7 weeks. However, we have only had one or two who have taken that much time. Yet, we have had some that have finished in half the time. It spreads out rapidly.

Q - Mr. Harvey - Ft. Benning

I was wondering if receiving the group at a certain time did cause any jam-up?

A - LT Connolly

You have to arrange your area to be able to take the maximum number that you can. After the first week they do start spreading out. Even though we receive students in a group input, our course has a scheduled input from CONARC every 3 weeks. However, they do not necessarily report to Ft. Gordon in that increment. After they have served their zero week we can take them, and we do on any day. Sometimes we have a group of 15 that comes in and we have already started eight students in that MOS earlier on a daily basis. We have the flexibility to take them any time.

COL Bean

We have now started the program throughout the different courses.
We enroll the student when they make him available to us, regardless
of the day. This appears to be working out without any problem.

Q - COL Weaver - Ft. Monroe

Have you cut the attrition rate by self-pacing?

A - COL Bean

I have four courses. I have two that have been in operation for
quite awhile. Dan, how about your's? It's been in operation the
longest.

A - Mr. Danilovich

Our attrition, and I have to resort to memory, was roughly 18 to 22
percent in Teletypewriter Equipment Repair Course. Quite high and,
of course, controlled to a great extent as best we could to satisfy
CONARC requirements. However, now we are much less concerned about
attrition because our total attrition is down to probably around 12
or 13 percent; there has been a significant reduction. However, I
feel that we still have some of the old feelings about controlling
attrition to a great extent. It should be what really is, and what
is really needed, rather than trying to manipulate it. In the past,
this has caused us some problems with graduates. I don't think this
occurs anymore. When a man finishes we are firmly convinced that he
can perform because of our performance objectives.

Q - COL Weaver - Ft. Monroe

Well I would have thought that when you said that you had some
finish in 24 weeks - slow learners. That should reduce your
attrition because ordinarily they would have been the ones who
dropped out.

A - Mr. Danilovich

Well, that is one thing to contend; but, under our 21-week program,
under group-paced instruction, it actually took, on the average, 24
weeks to get a man through the program because we recycled him. We
only had the recycling capability. We never had the advancing capa-
bility. The training was always much longer than reflected by
the POI. When you start talking about a savings of 2 weeks, it's
a much greater savings than that because it offset extra time which
we don't normally consider in our audited figures.

COL Bean

I think that as we develop the management control techniques, I feel strongly that our attrition is going down. In fact, with the pressure you apply, if you get good students that meet the prerequisites and are motivated, they'll go through it if they have the proper instructional material. This is the secret of it.

Q - Dr. Wagner - HumRRO

What is the latest point within the course that you apply your 30% criteria for washing them out?

A - COL Bean

The latest point? Normally, if he's a slow learner he's going to get to that stage early in the game. If he develops a progression index of 1.3 he'll do this during the early phase. Later he might go to a 1.5 progression index. That doesn't mean he is washed out. He'll hit a block there but, if the man looks like he is trying and we feel he'll make it, we let him slide.

Q - Dr. Wagner - HumRRO

But he can take longer than 27 weeks?

A - COL Bean

Right. In other words, if the instructor says "I feel I can make a repairman out of this man" and the instructor convinces us, then we let him stay.

LT Connolly

We have, at certain points, a gauge to look at each case. When a man goes over one we start talking to him and find out if he's got problems. A lot of times a guy's progression rate is down, not because he can't learn or he is a slow learner, but because his girlfriend back home got pregnant. Normally, you can talk to the man, find out what his problem is, and help him out. As COL Bean said, in our course, we have a lot of enlisted commitments, and the people who can't cut it normally reaches 1.3 very early in the course, within 4 or 5 weeks. By the time a man has reached 15 or 16 weeks in our course, he has already established the fact that he is going to make a repairman.

Q - Mr. Gillespie - Ft. Monroe

Addressing ourselves to the problems discussed -- fairly long courses, would you say, as a general rule and what we know as of today, we should not consider self-pacing or individualizing courses of less than 8 weeks?

A - COL Bean

No Sir. I think that you should. I feel, personally, that, it doesn't matter. You should go ahead and self-pace these courses; but, in order to self-pace them, the Department of the Army and CONARC should come up with a way to ship them. It's no use letting him finish 3 or 4 weeks early unless we can ship him. This is the problem.

Mr. Danilovich

I had a thought in this area; I don't know how feasible it is; I've kept it to myself. In the 8-week course area, and I like the idea of the peer bit or DA-type thing and I know Public Law 51 limitations and so on, there is one thing we haven't thought about. If a man finishes an 8-week course in 4 weeks, what is wrong with increasing the base of the man, giving him a broader-base capability as far as the field is concerned? If he has already shown that he can do one course in 4 weeks and there is another 6-week course there, why not offer him that course and increase his repertory and what he has to offer the commander? Is there something wrong with that?

A - Dr. Hunter

No, it just gets OPO pulling their hair out.

Mr. Danilovich

Fine - but you don't have to say anything.

Dr. Hunter

Yes you do because they insist on maintaining by name control on all assignments.

Mr. Danilovich

Well, I'm sure that somebody is going to pull his hair out about everything we are doing right now. Self-pacing has so many ramifications administratively.

COL Weaver - Ft. Monroe

I would say this, we have to continue to march on courses of any
length. We've got to force OPO into solving the problem. In fact,
we presented that to OPO about a year and a half ago and got ac-
knowledgements from, then, GEN Boyer, that they had to solve the
problem to take advantage of our advances in training or innovations
in training. So I think we have to keep the pressure on DA to come
up with a solution.

COL Bean

The major problem that we are faced with in self-pacing is that all of
instructions pertaining to the school system is based on group type
training. There are no instructions on how we are to control and
manage the self-paced courses. The staffing guide provides you the
instructors for group-pacing yet, it's a completely different ball
park in individualized instruction. These are the things we are
going to have to look at and get some directives out to support
as far as pertaining to the self-paced type instruction.

Q - MAJ Hagen - OAVCSA, Wash. DC

My question is more general in addressing individualized instruction
as a whole rather than specifics of your presentation here. The
Army. and I'm sure your other services, has traditionally relied on
the school system to foster the traditions of the service -- discipline,
the idea of teamwork, and a man being a part of a team. In your
experience here, have you noticed any harmful effects of treating
this soldier as an individual rather than as a member of a team.

COL Bean

Well, I'd like to state that I currently have a project going to
check the relationship of disciplinary problems of self-paced students
versus group-paced students. The initial report was that in the two
battalions that our students come from the disciplinary rate is way
down. The initial indications are that our students have less
problems than the students in the group type instruction.

Mr. Crick

I would like to ask COL Weaver to put his TM&S hat on and go back a
year and a half and give us some discussion on this. This question
arises quite often - individual versus unit training.

COL Weaver

All I can give you is a personal opinion. I don't think any soldier
has a feeling of being a member of a team while in the school

IV-118

environment. He gets that feeling after joining his unit. He is a member of a branch of service, perhaps, while he is in the school environment. A team member - he becomes that when he gets to his unit.

Mr. Crick

Basically, this problem has been addressed to CONARC about the unit training in the school. CONARC, at that time. was taking the stand that individual training was individual training, the unit training phase would follow on in the unit training. However, we know that in some of our courses, we start teaching the man to work as a unit. We have some here, the Pole Lineman type courses. This in essence is small unit training: he must work as a team with other individuals. I think we are seeing this in APSTRAT. In that short training time, we are getting some team type training in that individual course.

Mr. Crick

Thank you for your questions and thank you COL Bean and your members for answering the questions. According to our schedule, we were supposed to have a representative from the DA assignment section to be present and discuss this problem of assignments that we have been discussing for 3 days. Even with CONARC's assistance, we couldn't get anyone. The assignment people feel, and I have to say, I can see their point, that the current regulations cover graduates of self-paced courses provided Public Law 51 has been met. Now as you all know, and have heard, basically we have no problems if the man complies with Public Law 51. As you heard Dr. Hunter earlier, there is some work being done on Public Law 51. Our problem arises around these courses of less than 8 weeks where we have the man available after 10 or 11 weeks in the service. To this, DA says, there is nothing we can do until Public Law 51 has been met. They, in turn, point to our own regulations which say that if a man is accelerated he will be given OJT at the installation commensurate with the MOS he has just received. So they say, put him to work there. Well, as you graduate these people by the hundreds, there just isn't that much work around in the OJT program; and we sometimes find that the problems of assignment is really at our school. It is not a problem with DA. The assignments have been shipped from DA and they are at the installation. It's just that the installation is not processing these assignment instructions rapidly enough and you well know it's rather embarrassing to go knock-- ing on the door of DA with a problem and find that your problem is being caused at your own school.

Dr. Hunter

I just have a couple of antidotes in regard to that problem, things the school can do to expedite the receipt of timely instructions. For example, one school complained that their assignments were not arriving till 7, 8, or sometimes 9 weeks after the start of the training in the course. They finally called DA. If you do approach them they usually are pretty cooperative and they said "Well, lets trace out the communications chain." As it turned out all the TTC cards from the school were being routed through Walter Reed hospital, and Walter Reed didn't know what to do with them. It was a couple weeks before they decided that they should go over to DA. An example of another school that I know of, the request was initiated on the 2nd floor of the administration building and it went from the 2nd floor to the 1st floor. They had a PFC on the first floor that didn't know what to do with them. This kind of thing happens over and over again. Another example, when the personnel people on the local level transmit data to DA, that data must match exactly what's in the data bank; the automotive control of trainees that acts as the computer base. If somebody makes a typo and misspells a name, which still is perfectly recognizable to a human being, that computer is going to kick it out and it's going to be sent back to the school, and it's going to be at least 1 week and usually 2 that are shot. Little things like this. 5% on an average of the data submitted by the school to DA for assignment purposes is invalid, it's kicked out. Another example of what the school can do, the computer, which is the thing that keeps information on all the trainees that are in a training status, runs the computer base only on Tuesday nights, once a week only. Data that has been received in that data base by 0630 Tuesday gets incorporated in that data base. If trainees arrive over the weekend, the local school personnel people must submit a TTC to DA within 5 days after the man arrives. They have 5 days to do it. A man arrives over the weekend, they say don't put that data in until next Thursday. It's still within the 5 days. It's not going to get into that data base until the next Tuesday night. The school has 2 weeks advanced notification by name of who is going to arrive and when. They have plenty of time to get ready to put the TTC's in. If they got the TTC's in by, say, Monday noon, within the first day, they can catch the first run and can get a full weeks lead time on the personnel processing at DA. So there are things that the school can do. There are things also that DA can do.

COL Weaver

Maybe they could give more computer time.

Dr. Hunter

For example, if they went in on a real time system and ran the data as it came in, this could effect a savings in several cases. They are not going to do that. There are points of levers that can be manipulated by the schools if you know how the system works up there.

EFFECTIVENESS

↑

| TRAINING |

↓

COST

OBJECTIVE SATISFACTION

SYSTEM ENGINEERING OF TRAINING

SELF—PACING
- (1) FIVE COURSES AT PRESENT
- (2)   ADDITIONAL COURSES
  BEING DEVELOPED.

THE LEARNING SYSTEM

```
                    ┌──────────────┐
          ┌ - - - →│    ANNEX      │─────────────────────┐
          ┆        │ ORIENTATION   │                     │
          ┆        └──────────────┘                      │
          ┆                                              ↓
  ┌──────────────┐                          ┌──────────────────┐
  │ NEXT ANNEX   │                          │ 1 DISCRETE UNIT  │
  └──────────────┘                          │   OF LEARNING    │
          ↑                                 │   WITHIN LESSON  │
  ┌──────────────┐              ┌─────────┐ └──────────────────┘
  │ 7 END OF ANNEX│    N        │ NEXT    │ ┌──────────────────┐
  │   PERF. EXAM  │    O        │ DISCRETE│ │ 2 ORAL QUIZ      │
  └──────────────┘    │         │ UNIT    │ │   AND CRITIQUE   │
          ↑           G                     └──────────────────┘
  ┌──────────────┐    O                     ┌──────────────────┐
  │ 6 DRILL AND  │              NEXT        │ 3 WRITTEN        │
  │   PRACTICE   │              LESSON      │   QUIZ &         │
  └──────────────┘              OF ANNEX    │   CRITIQUE       │
          ↑                                 └──────────────────┘
  ┌──────────────┐                          ┌──────────────────┐
  │ 5 ANNEX      │                          │ 4 PERFORMANCE    │
  │ COMPREHENSIVE│                          │   CRITERIA       │
  │   QUIZ       │                          └──────────────────┘
  └──────────────┘
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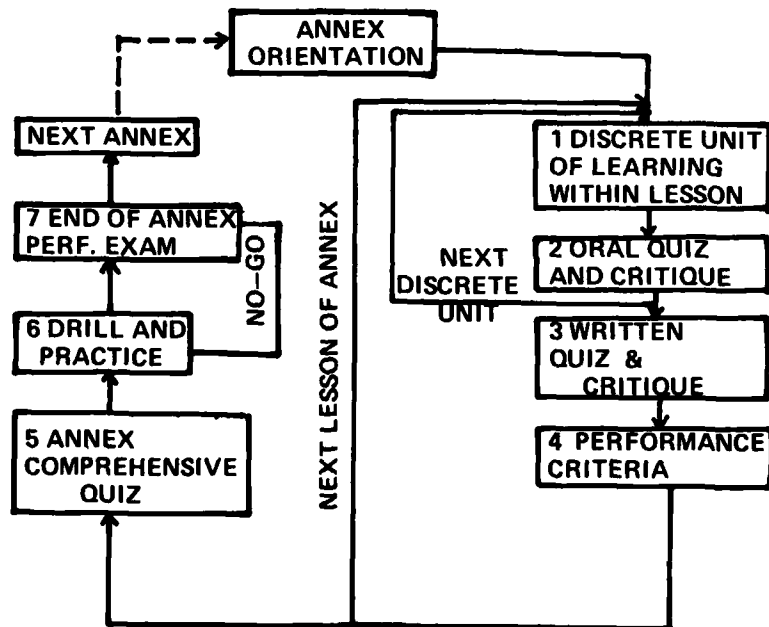
PROGRESSION INDEX

$$\frac{Hc - AI}{Ha} = PI$$

Hc: TIME IN COURSE

AI: TOTAL ABSENTEEISM

Ha: PERIOD'S OF TRAINING COMPLETED

A	B	C
$\frac{110 - 10}{100} = 1.0$	$\frac{90 - 10}{100} = .80$	$\frac{120 - 10}{100} = 1.10$

1.30

RECOMMEND: REASSIGNMENT OR
ENROLLMENT IN
ANOTHER COURSE

ABSENTEEISM

```
                    ┌─────────────────┐
            ┌──────▶│ ABSENTEE SLIP   │──────┐
            │       │ ORIGINATES IN   │      │
            │       │ COMPANY         │      │
            │       └─────────────────┘      │
            │                                ▼
   ┌────────────────┐              ┌─────────────────┐
   │ THRU BATTALION │              │ STUDENT TO      │
   │ TO COMPANY     │              │ INSTRUCTOR      │
   └────────────────┘              └─────────────────┘
            ▲                                │
            │                                ▼
   ┌────────────────┐              ┌─────────────────┐
   │ SECTION TO     │              │ INSTRUCTOR TO   │
   │ COURSE FOR     │              │ SECTION FOR     │
   │ CONSOLIDATION  │              │ RECORDING       │
   └────────────────┘              └─────────────────┘
            ▲                                │
            └────────────────────────────────┘
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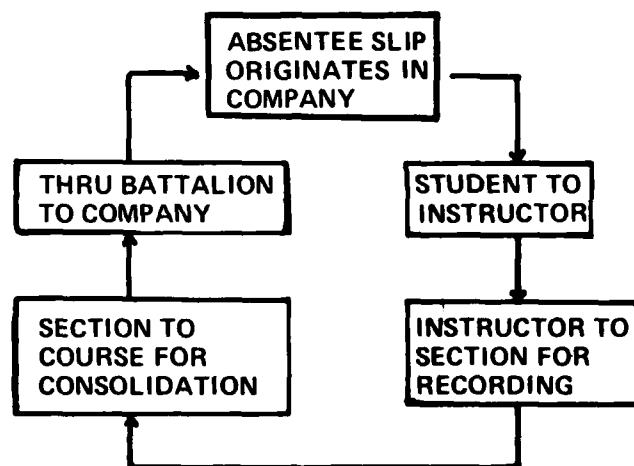
UNSCHEDULED BREAKS

BREAK PASS

BREAK LOG

PRESCRIBED DURATION

STIMULATING PROGRESSION

ESTABLISH POSITIVE LEARNING CONDITIONS

COUNSELORS

HONOR GRADUATE

PROMOTION

PASSES

STAR

MADE OUT BY INSTRUCTOR

REVIEWED BY COURSE MANAGER

ACTION BY COMPANY COMMANDER

REPORTING REQUIREMENT

COURSE LENGTH $-$ 7 $=$ TIME FOR
                                                  AVAILABILITY

$(20 \times 0.50) - 7 = 3$ WEEKS

$(10 \times 0.50) - 2 = 3$ WEEKS

PROJECTED GRADUATION DATE

$$\frac{(PI + \frac{A}{Pc})\ (CI - Pc)}{38} = PGW$$

A = ABSENCES $\qquad$ Pc = PERIODS COMPLETED
CI = TOTAL COURSE TIME $\qquad$ PGW = PROJECTED GRAD
$\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ IN WEEKS

$$\frac{(0.60 + \frac{20}{200})\ (700 - 200)}{38} = 9.21\ \text{WEEKS}$$

PI = 0.60 $\qquad\qquad\qquad$ CI = 700

$\frac{A}{Pc} = \frac{20}{200}$ $\qquad\qquad\qquad$ Pc = 200

EARLY FORECAST

ENABLES STUDENTS TO HAVE FORMAL GRADUATION.

PROVIDE MARGIN FOR SLIGHT DELAYS.

INFORMALLY CHECK PROFICIENCY.

CLASS STANDING

ACADEMIC RANKING SCORE = $100(2-PI)-2F$

PI = 0.90
F = ONE (1) NO—GO

$100(2-0.90)-2(1) = 108$ ARS

<u>OPTIMIZATION</u>

TO DEVELOP THE MOST

EFFICIENT AND EFFECTIVE

PROGRAM POSSIBLE

END—OF—ANNEX TEST RE-
SULTS.

TRAINING TIME

POI HOURS ADJUSTMENT

ANNEX	ANNEX PI	POI HRS	ADJUSTED POI HRS	PREDICTED ANNEX PI
A	0.85	60	53	.95
B	1.00	40	44	.95
C	1.10	25	28	.95
TOTAL		125	125	

$$\text{POI HRS} \times \frac{\text{ANNEX PI}}{\text{COURSE AVERAGE PI}} = \frac{\text{ADJUSTED}}{\text{POI HOURS}}$$

$$60X \quad \frac{.85}{.95} = 53.\text{\textbf{6}}$$

GRAPHIC ANALYSIS

AVERAGE ANNEX PI vs FAILURE RATE chart showing regions: OVERTRAIN, METHODS & MEDIA, UNDERTRAIN, MANAGEMENT UNDERTRAIN, TIME CONSIDERATION, ACCEPTABLE, with zones A, B, C. Y-axis values: 1.30, 1.20, 1.10, 1.00, 0.90, 0.80, 0.70. X-axis values: 5%, 10%, 15%, 20%.
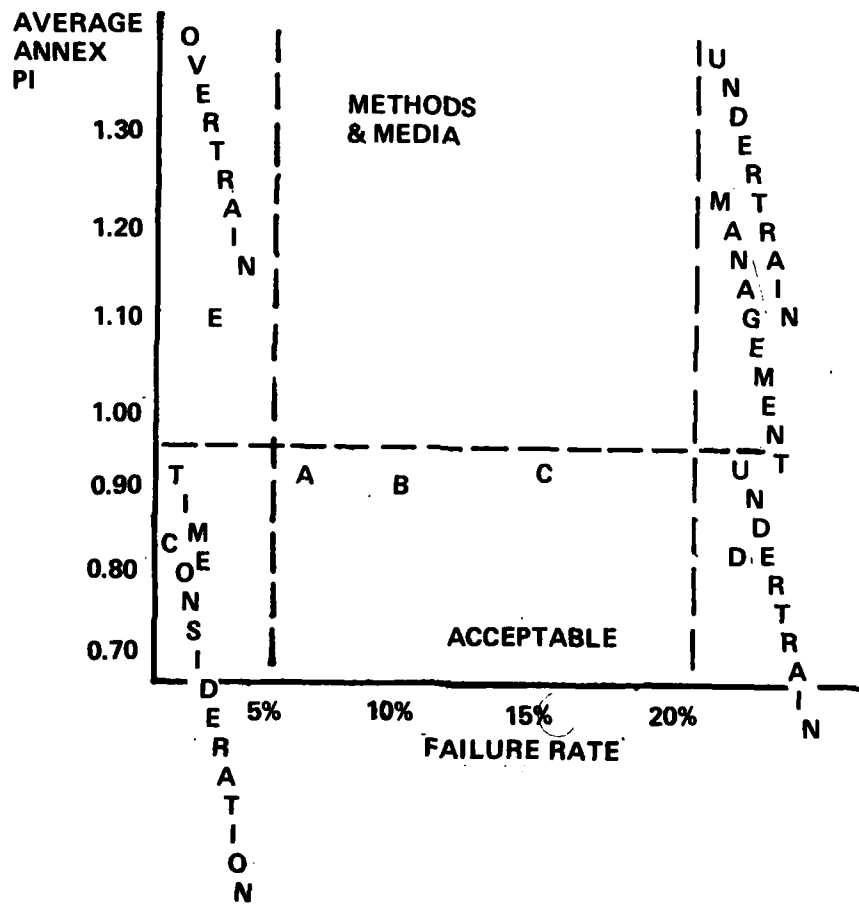
MANAGEMENT

UNDERTRAIN	OVERTRAIN	UNACCEPTABLE TIME AND FAILURE RATE
1. CHECK TEST RESULTS 2. IDENTIFY OBJECTIVES INVOLVED 3. CHECK LESSON CONTENT 4. CHECK METHODS 5. CHECK MEDIA 6. CHECK MANAGEMENT	1. CHECK TO DETERMINE IF MATERIAL IS "FAT" 2. CHECK FOR EXCESSIVE "DRILL AND PRACTICE" 3. CHECK FOR TEST COMPROMISE	(PERFORM UNDERTRAIN CHECKS FIRST; THEN CHECK TRAINING MANAGEMENT

SUMMARY

BETTER SPECIALIST

SAVINGS ($52,000 IN ONE COURSE)

GRADUATES RECEIVE ORDER
IMMEDIATELY.

UNITED STATES ARMY
SOUTHEASTERN SIGNAL SCHOOL
TELEVISION DIVISION
FORT GORDON, GEORGIA

TITLE: Controls and Management of   TVR: 9-70 Part A   DATE: 15 Sep 71
        Self-Pacing

VIDEO	AUDIO
	Notes to the attached CONARC conference television script attached:
	It is essential to maintain the technical directions as scripted, including the many dissolves. To overcome some of the pacing problems the use of dissolves will initiate, I suggest the use of a second "student" for the 'cut-away' style of the close-up shots throughout the script. This will allow action and close-ups to inter-cut with nicer pacing effects.
	The script requires at least four personnel, which includes two instructors and two students. Only one student will appear full face continually, the second student will only appear as close-ups of hands performing function. One instructor will be used in all but the last shot. It is essential, however, that the final scene show a second, different, instructor. There is to be no music to titles or credits, at either the beginning or the end.

IV-140

FGSESS Form 42
1 Mar 66   (USASESS Reg 350-6)

UNITED STATES ARMY
SOUTHEASTERN SIGNAL SCHOOL
TELEVISION DIVISION
FORT GORDON, GEORGIA

TITLE: __CONARC Conference Television__ TVR: __Part A__   DATE: __7 Sep 71__

VIDEO	AUDIO
FADE IN...as student walks "out-of-lens" to desk, places tool box and sits; instructor by desk, hands TM's, talks and points to equipment.	(Note: No title or credit cards...just fade in from black...also no music.)
	As the student enters each new room or annex, he is given an orientation to his learning guide, and related technical manuals, as well as a brief orientation to his equipment.
continue action in shot...	
DISSOLVE TO... ECU guide, hand opens it	The student begins, covering a discreet unit of learning within a lesson. Completing each discreet unit.............
and finger follows...	

iv-141

UNITED STATES ARMY
SOUTHEASTERN SIGNAL SCHOOL
TELEVISION DIVISION
FORT GORDON, GEORGIA

TITLE:_____ TVR:_____ DATE:_____

VIDEO DISSOLVE TO...	AUDIO
	....he returns to the instructor, who administers an informal oral quiz and criteria.
MS instructor at desk	
ZOOM OUT...to 2-shot MS. instr. questioning student	
DISSOLVE TO...	
ECU guide as hand slowly flips pages.	This cycle continues for each discreet unit of learning, until the lesson is completed.
DISSOLVE TO...	
student hands quiz to instr.	At the end of the lesson, the student given a brief written quiz which is immediately critiqued for him by the instructor.
and both check quiz	

IV-142

FGSESS Form 42
1 Mar 66

(USASESS Reg 350-6)

UNITED STATES ARMY
SOUTHEASTERN SIGNAL SCHOOL
TELEVISION DIVISION
FORT GORDON, GEORGIA

TITLE:_____ TVR:_____ DATE:_____

VIDEO	AUDIO
DISSOLVE TO...	
ECU equip., covers off	This written quiz and critique is followed by a performance criterion in which the student must apply, to actual problems, the skills and knowledges learned
hands on adjustments then...	from the just-completed lesson.
PAN TO...finger tracing schematic diagram	
	This larger cycle continues for each lesson of the annex, until the annex is completed.
DISSOLVE TO...	
instr. hands 2 page quiz to student.	At the end of the annex, the student is administered an in-depth comprehensive quiz.

IV-143

FGSESS Form 42
1 Mar 66

(USASESS Reg 350-6)

TITLE:_____ TVR:_____ DATE:_____

VIDEO	AUDIO
TAKE TO...hands/pencil on quiz sheet.	
	....which is corrected and the results fed back to him, immediately.
DISSOLVE TO...MS student working on equipment... low zoom into hands.	Drill and practice makes the student utilize all the procedures and knowledges covered during the entire annex. There is constant feedback as the instructor places problems on the equipment and the student locates them.
DISSOLVE TO...MS different instructor by equipment student enters, sits down. Instr. talks to student, then leaves	With his instructor's approval, the final end-of-annex performance test is given to the student by the central testing facility. A "No-Go" here will return him to his classroom for more drill and practice, but a "Go" allows him to continue to the next annex. He will
a student begins work.	then start the instructional cycle over again.
FADE TO BLACK	FADE TO BLACK.

UNITED STATES ARMY
SOUTHEASTERN SIGNAL SCHOOL
TELEVISION DIVISION
FORT GORDON, GEORGIA

TITLE: CONARC Conference Television   TVR: Part B   DATE: 7 Sep 71

VIDEO	AUDIO
FADE IN... to cover shot of final shop facility & PAN...	(Note: no title or credit cards...just fade in from black...also no music.)
	NARRATOR:
	Students who complete training before their projected graduation date... may be assigned to perform one of two tasks.
pan	The first is to become...
TAKE TO... several repairmen working	
	a repairman for the course's final shop.
	As a course classroom...
TAKE TO...ECU phone, instructor answers, nods & hangs up.	
	develops deadlined equipment, the final shop is
	notified,

FGSESS Form 42
1 Mar 66

(USASESS Reg 350-6)

TITLE:_____ TVR:_____ DATE:_____

VIDEO	AUDIO
TAKE TO...MS shop, repairman gets up/takes tools.	and a student/graduate is designated to repair the equipment.
TAKE TO...WS, inside classroom; repairman walks in-goes to instr., who designates machine, repairman goes to it	He will usually repair the course deadlined equipment in the classroom, easing the instructor's workload there.
then PAN room (left)	Here in the classroom we can also observe the second task to which a student may be assigned...

IV-146

FGSESS Form 42
1 Mar 66

(USASESS Reg 350-6)

UNITED STATES ARMY
SOUTHEASTERN SIGNAL SCHOOL
TELEVISION DIVISION
FORT GORDON, GEORGIA

TITLE:_____ TVR:_____ DATE:_____

VIDEO	AUDIO
Stop pan and SLOW ZOOM IN to MS two-shot... two should be animated in discussion of problem.	
	as an assistant instructor. Here he provides peer instruction for those students who would otherwise add to the primary instructor's workload.
TAKE TO...CU repairman in classroom...working.	
	Whether working as a repairman for course deadlined equipment or ...
TAKE TO... ECU ass't instr. (animated)	as an assistant instructor, the student/graduate is developing his own proficiency and self-confidence, as well as reducing the instructor's workload. The instructor is free now to provide more detailed tutorial training for those students requiring it.
slow ZOOM OUT to cover shot of room... FADE TO BLACK......	FADE TO BLACK.

FGSESS Form 42
1 Mar 66

IV-147

(USASESS Reg 350-6)

TITLE:_____ TVR: 9-70 Part C DATE:_____

VIDEO	AUDIO
This is an outline of Part B. TVR audio is "ad-lib" from this outline.	MANAGEMENT DEVICES AND CONTROLS

1. Classroom

    a. Student Training Record.

        (1). Purpose: basic document used to record student progress and collect data.
        (2). Use:
            (a). When student enters classroom:
                (1). Heading of student training record is filled out.
                (2). A student training record is kept on each student.
            (b). When student starts a lesson:
                (1). Start time is recorded.
                (2). Completion of each discrete unit is checked and the student's progress is noted on his record.
                (3). Satisfactory completion of lesson quizzes and criterious is noted also.
            (c). When student finishes a lesson:
                (1). Completion time is recorded.
                (2). Total time used for lesson is noted.
                (3). Any special problems a student has are also recorded.
            (d). This procedure is repeated for subsequent lessons of the annex.

    b. Random breaks.

        (1). Allows student to take a break so as not to interfere with his learning.
        (2). Method:
            (a). Student requests break pass.
            (b). Logs himself out.
            (c). Logs in after break.
            (d). Returns his pass.

IV-148

UNITED STATES ARMY
SOUTHEASTERN SIGNAL SCHOOL
TELEVISION DIVISION
FORT GORDON, GEORGIA

TITLE:_____ TVR:_____ DATE:_____

VIDEO	AUDIO

	AUDIO
	c. When student completes annex training.
	
	(1). Student is given his record.
	(2). Proceeds to central testing.
	   (a). Telephone notification.
	   (b). Central testing starts preparing for student's end-of-annex test.
	
	2. Central Testing
	
	  a. Student Training Record
	
	   (1). Date and start time of test is entered on student training record.
	   (2). Stop time and total time is recorded upon completion.
	   (3). Results:
	     (a). Go: student goes to section chief.
	     (b). No Go:
	       (1). Reasons entered on student's record.
	       (2). Student returns to classroom for remediation.
	
	3. Section Office
	
	  a. Student arrives
	
	   (1). Student training record checked.
	   (2). Summary training record posted.
	     (a). One for each student.
	     (b). Data transcribed from student training record.
	       (1). Annex start and finish time.
	       (2). Hours used.
	       (3). Total hours absent.
	       (4). Special remarks pertaining to "Star" reports and retests.
	
	  b. Computes Progression Indexes.

IV-149

TITLE:_____   TVR:_____   DATE:_____

VIDEO	AUDIO
	AUDIO
	(1). Annex: Posted to both student and summary training records.
	(2). Cumulative: Posted to summary training record only.
	c. Disposition of training reports.
	(1). Summary training record sent to next section: follows student through the course.
	(2). Student training record is filed for later use in improving training.
	d. Notification of Course Office of Students Progression.
	(1). Section calls office.
	(2). Locator card pulled.
	(3). Posts Progression index, which also indicates that student has moved to the next annex.
	(4). Check to determine if availability should be computed at this time.
	e. Personnel status report.
	(1). Submitted daily to course office.
	(2). Keeps course informed on student and instructor absenteeism, with reasons if known.
	f. Operations Report.
	(1). Weekly report to the course.
	(2). Data included:
	(a). GO - NO GO of individual lessons.
	(b). Input - Output of students.
	(c). Faculty board actions.
	(d). Average annex progressions.
	(e). Attrition rate.
	(f). Instructor manhours expended.

IV-150

TITLE: _____ TVR: _____ DATE: _____

VIDEO	AUDIO
	g. Section Status Report

AUDIO

g. Section Status Report

    (1). An as-requested report.
    (2). Summary of specific lesson deficiencies:
        Used for isolating training and manage-
        ment weaknesses detected through analysis
        of operation report.

4. Course

  a. Personnel Status Report

    (1). Analyzed to determine if workloads are
        properly distributed.
    (2). Notes if unusual absenteeism trends are
        developing.

  b. Receives operations report from sections on a
  weekly basis

    (1). Examines for instructional weaknesses.
      (a). If detected, requests section
         status report.
      (b). Initiates action with chief
         instructor to correct deficiencies.
    (2). Notes adverse trends in attrition.
    (3). Searches for possible pile-up trends or
        situations.
    (4). Sees if personnel are being utilized effi-
        ciently.
    (5). Notes trends in average progression.
    (6). For example:
      (a). Annex B shows an adverse trend in
         that average training time is quite
         low, but the annex failure rate is
         too high.
      (b). The section status report shows that
         the students are progressing through
         three lessons at a fast rate but are
         getting no-go's on the lesson checks
         quite frequently.

IV-151

UNITED STATES ARMY
SOUTHEASTERN SIGNAL SCHOOL
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FORT GORDON, GEORGIA

TITLE:_____ TVR:_____ DATE:_____

VIDEO	AUDIO
	(c). The objectives of these lessons are also the ones being failed on the end-of-annex test.
	(d). A decision is made, therefore, to determine why the students are not learning satisfactorily in these areas.
	(e). These checks will be accomplished:
	(1). Adequacy of lesson progress checks.
	(2). Content of training material.
	(3). Sequencing of material.
	(4). Appropriateness of media.
	(f). The area of weakness detected will then be corrected.
	c. Consolidates data and feeds back to section, along with recommendation for improvement.
	d. Sends course operations report to department on monthly basis.
	(1). Reflects pertinent data, in consolidated form, reported on section, operation reports.
	5. Department
	a. Course operations report received monthly.
	(1). Examines course trends comparatively.
	(2). Looks for problems.
	b. Comparative Data fed back to courses.
	(1). Special achievements and techniques which have resulted in greater effectiveness and efficiency.
	(2). Common factors which can influence all courses in a favorable manner.

FGSESS Form 42
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IV-152

(USASESS Reg 350-6)

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